




<https://doi.org/10.1590/198053147167>

## SCHOOL INCLUSION AND PHYSICAL INFRASTRUCTURE OF ELEMENTARY SCHOOL

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### Abstract

This paper aimed to verify the conditions of the physical infrastructure of schools in a Municipal Elementary School System, considering the target students of Special Education. The design used was the qualitative of the descriptive type. 16 managers of municipal elementary schools in the city of Bauru, São Paulo participated in the research. The instruments used were the script for observing the physical space and inclusive resources of the school context and the interview script for school managers. The results showed that the analysis in loco differs from the standpoint of the managers. However, both agree on the need to expand and improve the physical infrastructure, greater availability of material resources and adapted resources, principally in the common class.

ACCESSIBILITY • SPECIAL EDUCATION • SCHOOL INCLUSION • SCHOOLS

### INCLUSÃO ESCOLAR E INFRAESTRUTURA FÍSICA DE ESCOLAS DE ENSINO FUNDAMENTAL

#### Resumo

Este artigo tem como objetivo verificar as condições da infraestrutura física das escolas de um sistema municipal de ensino fundamental, considerando os alunos público-alvo da educação especial. O delineamento utilizado foi o qualitativo descritivo. Participaram da pesquisa 16 gestores das escolas municipais de ensino fundamental da cidade de Bauru, São Paulo. Os instrumentos utilizados foram o roteiro de observação do espaço físico e recursos inclusivos do contexto escolar e o roteiro de entrevista para os gestores escolares. Os resultados apontaram que a análise in loco difere do ponto de vista dos gestores. No entanto, há concordância sobre a necessidade de ampliação e melhoria da infraestrutura física, maior disponibilidade de recursos materiais e recursos adaptados, principalmente na classe comum.

ACESSIBILIDADE • EDUCAÇÃO ESPECIAL • INCLUSÃO ESCOLAR • ESCOLAS

## INCLUSIÓN ESCOLAR E INFRAESTRUCTURA FÍSICA DE ESCUELAS DE EDUCACIÓN FUNDAMENTAL

### Resumen

El propósito de este artículo es verificar las condiciones de la infraestructura física de las escuelas de un sistema municipal de educación fundamental, considerando a los alumnos como público objetivo de la educación especial. El delineamiento que se utilizó fue el cualitativo del tipo descriptivo. Participaron en el estudio 16 administradores de las escuelas municipales de educación fundamental de la ciudad de Bauru, São Paulo. Los instrumentos utilizados fueron el guión de observación del espacio físico y de los recursos inclusivos del ámbito escolar y el guión de entrevista para los administradores escolares. Los resultados señalaron que el análisis in loco difiere desde el punto de vista de los gestores. Sin embargo, hay concordancia sobre la necesidad de ampliar y mejorar la infraestructura física, una mayor disponibilidad de recursos materiales y recursos adaptados, sobre todo en la clase común.

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## INCLUSION SCOLAIRE ET INFRASTRUCTURE PHYSIQUE DES ÉCOLES

### Résumé

L'objectif de cet article a été de vérifier les conditions relatives à l'infrastructure physique des écoles d'un réseau municipal, pour l'accueil des élèves cibles de l'éducation spécialisée. L'étude a utilisé une approche qualitative et descriptive, menée auprès de 16 directeurs d'écoles communales de la ville de Bauru, São Paulo. Un guide d'observation de l'espace physique et des ressources inclusives en contexte scolaire, ainsi qu'une feuille de route pour l'entretien des gestionnaires scolaires ont été utilisés. Les résultats ont montré que l'analyse in loco diffère selon les gestionnaires. Néanmoins, il y a un accord sur le besoin non seulement d'élargir et d'améliorer l'infrastructure physique, mais aussi de disponibiliser davantage de ressources matérielles et de ressources adaptées, surtout dans les classes communes.

ACCESSIBILITÉ • ÉDUCATION SPÉCIALE • INCLUSION SCOLAIRE • ÉCOLES

**I**N THE 1990S, WITH THE SIGNING OF INTERNATIONAL DOCUMENTS AND THE EXPANSION OF legislation on the right to schooling for students with disabilities, above all, the Organização das Nações Unidas para a Educação, Ciência e Cultura [World Conference on Education for All] (UNESCO, 1990), the Salamanca Statement (UNESCO, 1994), the Lei de Diretrizes e Bases da Educação Nacional [Law of Directives and Bases of National Education] (Lei n. 9.394, de 20 de dezembro de 1996) and the *Política Nacional de Educação Especial na Perspectiva da Educação Inclusiva* [National Policy on Special Education from the Perspective of School Inclusion] (2008), supported by public educational policies, they extended the Special Education paradigm to the Inclusive Education principle.

School inclusion is about strengthening the teaching-learning process based on human rights that responds to needs, skills, characteristics of all, including discussions and developments necessary for successful learning by Público Alvo da Educação Especial [Special Education Target Public](PAEE)<sup>1</sup> students in mainstream school (UNESCO, 2008; Fonseca et al., 2018). However, the insertion of these students, especially those with disabilities or reduced mobility in schools, has demanded changes related to the organization of school' settings (Silva & Kassar, 2019), due to the observance of physical structure and materials of concern (Monteiro & Silva, 2015; Silva & Kassar, 2019) with often constitute obstacles to its use.

Since then, the school infrastructure theme has been the subject of research by scholars (Satyro & Soares, 2007; Soares et al., 2013; Sá & Werle, 2017; Santos, 2019). Based on the 2018 school census, the municipal network is responsible for approximately two-thirds of basic education (Ministério da Educação [MEC], 2019). However, studies show that only 0.6% of these schools have adequate infrastructure and congruent with the purposes of quality education (Soares et al., 2013). Gallo et al. (2011), when analyzing the accessibility conditions of people with physical disabilities in 27 schools in a municipality in Santa Catarina, they use a protocol with questions about accessibility, physical space, furniture and buildings and observed that none of the analyzed schools were adapted in all the evaluated items, 17 of them did not have access ramps, 14 did not have adapted toilets, 16 did not have adapted drinking fountains and none had signs for disabled people.

According to Moraes (2007), architectural obstacles and barriers, bumpy sidewalks, inexistence of access ramps, signs and toilets are constantly present in schools, demonstrating the importance of allowing access, not only inside these buildings, but also to adapt the conditions of the roads, parking and eliminating the maximum barriers that hinder the movement of people. In addition, the organization of school buildings composed of traditional classrooms, little diversity of furniture arrangement and restricted use of teaching equipment, tend to impair its functionality, which is more associated with aspects of the dimensioning of environments, equipment, furniture and variety of environments available to serve all students (Kowaltowski, 2014).

Satyro and Soares (2007), they also highlight that shortages in the school context, such as inadequate buildings and facilities, no libraries, sporting places and laboratories, low access to textbooks, reading materials, inadequate classroom size and high number of students, tend to directly influence

1 According to Decree nº 7.611 of november 17, 2011, the target public of Special Education is considered people with disabilities, global developmental disorders and with high abilities or giftedness.

performance from the students (Kimura, 2008) which implies the need to know the conditions of schools in the country, especially public ones, responsible for 90% of enrollments in primary education (Satyro & Soares, 2007).

In order to minimize these inequalities, since 2008 the *Política Nacional de Educação Especial na Perspectiva da Educação Inclusiva* [National Policy on Special Education from the perspective of school inclusion] (2008) has been highlighting the urgency to rethink the construction of educational systems that demand a structural and cultural change in the school in which all students have their specificities met, according to Universal Design. According to the Instituto Nacional para a Reabilitação [National Institute for Rehabilitation] (2014), Universal Design or “Design for All” aims to simplify the lives of people with or without disabilities, regardless of age, stature or capacity, when creating products, structures, furniture, equipment, communication/ information and buildings that allow opportunities to be equated so that they can fully share life in society with autonomy, independence and security.

According to the Instituto Nacional para a Reabilitação (2014), the realization of a Universe Design project must contemplate seven basic principles:

- Equitable use: which can be used by any group.
- Flexibility of use: encompassing a wide range of individual preferences and capabilities.
- Simple and intuitive to use: to understand, regardless of user experience.
- Perceptible information: that effectively provides the user with the necessary information, regardless of the existing environmental/physical conditions or the user’s sensory capabilities.
- Error tolerance: which minimizes risks and negative consequences resulting from accidental or involuntary actions.
- Minimum physical effort: which can be used effectively and comfortably with minimal fatigue.
- Dimension and space for approach and use: space and dimension suitable for approach, handling and use regardless of the user height, mobility or posture of the user.

For this the Ministério da Educação [Ministry of Education] (MEC) has offered technical and financial support for architectural adjustments to school buildings and for the production and distribution of resources “didactic and educational materials in Braille, audio and Brazilian Sign Language – LIBRAS, laptops with speech synthesizer, software for alternative communication and other technical aids that allow access to the curriculum” (Decreto n. 7.611, de 17 de novembro de 2011, p. 3, own translation). These resources are mediated by the Accessible School Program (PEA), which has financed the architectural adequacy of schools, with the construction of ramps, toilets, access roads, installation of handrails and visual signage, tactile and audible signs, as well as acquisition of wheelchairs, Assistive Technology resources, drinking fountains and accessible furniture (MEC, 2013). Its objective is to promote the inclusion of students with disabilities, global developmental disorders and high skills / giftedness enrolled in common classes of regular education, guaranteeing them accessibility that enable the right to share common places of learning and access to the environment through physical, didactic and pedagogical resources, in addition to strengthening better communication and information sharing (Decreto n. 7.611, de 17 de novembro de 2011). However, the current reality has demonstrated the difficulties in guaranteeing the inclusion indeed (Gallo et al., 2011; Médice et al., 2015; Santos, 2019; Silva & Kassar, 2019).

Médice et al. (2015) in order to identify and describe architectural barriers in 14 municipal elementary schools in a city in the west of the state of São Paulo, it was used a standardized protocol to map the architectural conditions of access. The results pointed out that the 14 schools visited didn’t have non-slip flooring and tactile flooring in the various sector analyzed, the dimensions, the grip and the slide of the handrails were inadequate, the stairs were not associated with ramps and

the toilets did not have a transfer area, adapted mirrors and washbasins. In another study, Silva and Kassar (2019) observed that in 16 of 17 schools in a municipality that received adaptations in schools to serve PAEE students continued with a set of spaces outside the standards proposed by the technical standards that, in the majority, completely prevented its use.

In view of such surveys and the importance that theme represents to the educational area, especially when compared to international studies, Brazilian research has less detailed information about the school environment, with suggests instruments that specify these aspects or studies *in loco* (UNESCO, 2019). This article aimed to verify the conditions of the physical infrastructure of the schools in a Municipal System of Elementary Education, considering PAEE students, based on two guiding questions: 1) Does the Municipal Elementary School System have adequate infrastructure to receive PAEE students, according to the manager's standpoints? 2) Does the Municipal Elementary School System have adequate infrastructure to receive PAEE students, according to *in loco* observation?

Finally, the contribution of the research is emphasized for being carried out *in loco* in the 16 municipal schools of municipal education of the city and for the possibility of possible comparisons, by schools and by the items, demonstrating the points that need more attention for the construction of a quality school.

## Methods

This is a descriptive qualitative research.<sup>2</sup> According to Gil (2010), descriptive research has as its main objective the description of the characteristics of the study population, the phenomenon, or the establishment of relationships between variables. The chosen design was naturalistic and/or field observation, which consists of direct observation of the studied group and interviews with local subjects to understand their representations of what happens in their reality (Cozby, 2003).

Participated in the research, 16 managers of municipal elementary schools in the city of Bauru/SP, fifteen female and one male. Inclusion criteria were: the participation of a manager from each municipal elementary school. To identify the participants, the initial letter of Manager function was used, followed by the sequential number in which the schools were visited (G1, G2, G3 and so, consecutively).

The city of Bauru is located in the Midwest region of São Paulo. According to the Instituto Brasileiro de Geografia e Estatística [Brazilian Institute of Geography and Statistics] (IBGE) in 2010, the municipality consisted of 343.937 inhabitants, with the estimated population for 2018, 374.272. The area that makes up the territorial unit of the city consists of 667,684 km<sup>2</sup> and the population density per km<sup>2</sup>, is 515,12 inhabitants/km<sup>2</sup> (IBGE, 2017).

According to data from Municipal Education Department,<sup>3</sup> the Municipal Education System is composed of 66 *escolas municipais de ensino infantil* [Municipal Schools for Early Childhood Education] (EMEI), 16 *escolas municipais de ensino fundamental* [Municipal Schools of Elementary Education] (EMEF) and three *centros de educação de jovens e adultos* [Youth and Adult Education Centers] (CEJA). Since 2005, the city has adopted Special Education services from the perspective of Inclusive Education in its regular education system, in order to offer PAEE students the Specialized Educational Service in the Multifunctional Resource Rooms, where the specialist teacher supplements the teaching to students with special needs high abilities/giftedness and complements it for students with disabilities and global developmental disorder. In 2017, the year of research data collection, the 16 EMEFs were responsible for 8,477 of the city's enrollments, of which 147 were PAEE students and 24 were in the evaluation process.

2 The present study is an integral part of the research "Evaluation of the quality of education offered to the target students of Special Education in public schools in the district of Bauru" (Capellini, 2018), subsidized by the Fundação de Amparo à Pesquisa do Estado de São Paulo (Fapesp, processo 2015/22397-5), approved by the Research Ethics Committee of the Faculty of Sciences of the Universidade Estadual Paulista "Júlio de Mesquita Filho" (UNESP), Bauru campus, according to *Resolução n. 466, de 12 de dezembro de 2012*, and authorized by the Ethics Committee of the Education Secretariat of the city where this study was conducted.

3 Data provided by the Secretaria Municipal de Educação (2017, unpublished).



The research was carried out in 16 municipal elementary schools in the city of Bauru/SP. The identification of the schools and the number of students and employees of each one is shown in Table 1.

**TABLE 1**  
NUMBER OF STUDENTS AND STAFF – CITY OF BAURU – 2017

SCHOOLS	Year Opening	Elementary School	Nº of rooms	Nº of total students	Nº of PAEE students	PAEE students in %	Nº in employees	Reason pupils employees	Nº of Teachers	Reason students teachers
E1	1990	I e II	18	476	12	2,5%	21	22,6	27	17,6
E2	1998	I	16	430	3	0,6%	15	28,6	26	16,5
E3	2004	I	20	582	3	0,5%	15	38,8	34	17,1
E4	1986	I e II	26	558	15	2,6%	16	34,8	44	12,6
E5	1998	I	14	339	5	1,4%	10	33,9	20	16,9
E6	2002	I	20	598	8	1,3%	13	46	28	21,3
E7	2012	I	22	584	11	1,8%	21	27,8	35	16,6
E8	1988	I e II	36	887	15	1,6%	20	44,3	59	15
E9	2002	I e II	18	460	15	3,2%	16	28,7	33	13,9
E10	2008	I	23	623	13	2%	14	44,5	39	15,9
E11	1983	I e II	21	560	10	0,1%	40	14	13	43
E12	2005	I	18	455	5	1%	12	37,9	28	16,2
E13	2008	I	18	511	11	2,1%	13	39,3	30	17
E14	2004	I	22	556	6	1%	18	30,8	37	15
E15	2000	I	22	532	8	1,5%	12	44,3	36	14,7
E16	2005	I	13	326	7	2,1%	8	40,7	25	13

Source: Elaborated by the author with data provided by schools and by the Municipal Department of Education (2017), unpublished

### Instrument of data collection procedure

*The script for observing the physical space and inclusive resources of the school context* was adapted by Santos (2019) of the *Observation inventory in daycare centers* in Mendes (2002). The script consists of 34 structured items, divided into five sub-items (entrance access, classroom, bathroom, refectory and other resources) and questions for characterizing the school context, including school opening date, total number of students, PAEE students, of rooms, employees and teachers. However, in the present study, data regarding the bathroom were discarded because it was considered that in elementary schools there was no need to adapt the size of sinks and toilets to the size of children.

*The interview script for school managers.* It is a semi-structured interview script, developed by Santos (2019) for school managers containing two questions about how they consider the conditions of the school physical space and what are the possible improvements to the context.

After the project has been approved by the Research Ethics Committee of the UNESP Faculty of Sciences – Bauru campus and by the Municipal Education Secretariat where the study was conducted, the researcher prepared a schedule of visits to schools between the months of April to July 2017 and forwarded it to the city's Department of Education, for prior knowledge to the school board about the day and time for data collection.

On the agreed day, the researcher attended the school for data collection, for approximately 40-90 minutes. After presenting the research objectives and clarifying doubts, the available school manager was invited to participate in the interview.

Participants who accepted the invitation signed the Termo de Consentimento Livre e Esclarecido [Free and Informed Consent Form] (TCLE). In a private and confidential place, they answered the interview. The use of the audio recorder was used to record the responses (in cases where the participants did not authorize the recording of the interview, the researcher wrote the responses of the participants by hand). Then, the researcher analyzed the conditions of the school's physical infrastructure *in loco*, collecting images via cellphone and filling in the *script for observing the physical space and inclusive resources of the school context*, accompanied by a school employee or the school manager himself.

### Data analysis procedure

For analysis of the data in the observation script, a specific value (from half a point to two) was assigned to each item in the analysis categories, according to their relevance (Table 2), totaling ten points, per category. After the sum of the results obtained in each category, the total score was divided by the number of categories analyzed ( $n=4$ ), assigning a general grade to each school, classifying as inadequate those that obtain scores from zero to five, as partially adequate, those with scores from 5.1 to 7.9 and scaled as scores from 8.0 to 10.

#### FRAME 1

#### SCORES FOR EACH ITEM IN THE CATEGORIES OF "SCRIPT FOR OBSERVING PHYSICAL SPACE AND INCLUSIVE RESOURCES IN THE SCHOOL CONTEXT"

ANALYSIS CATEGORIES								
Item	ACCESS	score	CLASSROOM	score	REFECTORY	score	OTHERS RESOURCES	score
1	Signposted routes	1,5	Airy room	1,0	Size of tables and chairs	2,0	Activities drawn on the floor	1,0
2	Braille/LIBRAS signage	1,5	Lighting	1,0	Distance between furniture	2,0	Posters or mural with works	1,0
3	Illuminated paths	0,5	Low noise level	1,0	Number of children per table	2,0	Stage	1,0
4	Obstacle-free routes	1,5	Room size	1,0	Utensils in good condition	2,0	Video room	1,5
5	Adequate external access	1,5	Areas defined by carpets and doormats	1,0	Need for the child to wait for the table	2,0	Library	1,5
6	Tactile flooring	1,5	Furniture size and layout	1,0			Elevator	1,0
7	Non-slip flooring	1,5	Diversity of materials	2,0			Differentiated activities	1,5
8	Proximity of the management team	0,5	Equipment needed for PAEE students	2,0			Playground	1,5

Source: Elaborated by the author with the score suggested by the instrument's author (Mendes, 2002).

The transferred fees were fully transcribed and treated according to the thematic analysis. This analysis can be graphically presented in terms of a word, a phrase or a summary, specific to unraveling the core meanings of communication, whose presence and frequency mean something to the chosen analytical object (Bardin, 2011).

## Results and discussion

The results obtained by *the script for observing the physical space and inclusive resources of the school context* were grouped into analysis categories, namely: entrance access, classroom, refectory and the other resources. The criteria used to score the items followed the guidelines for eliminating barriers and ensuring access for all students, according to the MEC (2009). The results of this instrument served as a criterion for evaluating schools, however, as it is an instrument with structured items, completed by the researcher, they can be interpreted differently, according to the subjectivity of the evaluator.

In this way, the analyzes carried out *in loco* through *the script of observation of the physical space and inclusive resources of the school context* allowed to verify and compare the suitability of each category to the attendance of PAEE students and to contrast with the standpoint of the managers, with the objective of setting goals and strategies for improving conditions for school inclusion. The analysis *in loco* performed by the evaluator took into account the scores obtained in each category, while the evaluation of the managers led to their standpoint in relation to aspects of the School, but which also categorized them as adequate, inadequate and adequate in parts.

In general, the conditions of entrance access to schools were the least adapted and, therefore, had lower scores in the items marked routes signage in Braille/LIBRAS, tactile floor and non-slip floor. Classrooms were cramped, with poor ventilation and high noise. The refectory met the criteria analyzed and at least fourteen of the sixteen schools had other resources complementary to the inclusion of students. However, it was observed that no school was planned with a view to serving everyone and, although some adjustments to the physical infrastructure have been made, much still needs to be improved to be considered of quality and totally adequate to serve PAEE students. To understand these needs, the analyzes performed on each item are presented below.

### Entrance Access

Analysis factors of the item in question: signed routes, Braille/LIBRAS signage, illuminated routes, obstacle free routes, adequate external access, tactile flooring, non-slip flooring and proximity of access to the management team.

**TABLE 2**  
*SCHOOL ACCESS CONDITIONS*

SCHOOLS	ENTRANCE ACCESS															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Signed routes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Braille/LIBRAS signage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Illuminated routes	0	0.5	0.5	0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Obstacle free routes	0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Adequate external access	1.5	1.5	1.5	1.5	0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Tactile flooring	0	1.5	0	0	0	0	0	0	1.5	0	0	0	0	0	0	0
Non-slip flooring	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	1.5	0
Proximity of access to the management team	0.5	0.5	0	0.5	0.5	0.5	0.5	0.5	0	0.5	0	0	0	0.5	0.5	0
<b>SCORE</b>	<b>3.5</b>	<b>5.5</b>	<b>3.5</b>	<b>3.5</b>	<b>2.5</b>	<b>4.0</b>	<b>4.0</b>	<b>4.0</b>	<b>5.0</b>	<b>4.0</b>	<b>3.5</b>	<b>3.5</b>	<b>3.5</b>	<b>4.0</b>	<b>5.5</b>	<b>3.5</b>

Source: Elaborated by the author with the data observed in schools.



In the entrance access category, the average of schools was 3.9 points. School five had the lowest score (2.5 points) and schools two and fifteen had the highest score (5.5 points). None of the schools were scored in the items marked routes and signage in Braille/LIBRAS, however fifteen of the sixteen schools had obstacles-free routes and adequate external access.

The routes of the schools would be considered signposted if they had indicative signs for orientation of exits, stairs, ramps, identification in large letters, with color contrast and relief next to the doors of the different environments to indicate the activities they are destined for and, color contrast between floor, wall and doors to facilitate people's orientation (MEC, 2009). However, as all schools visited had only identification on the doors of the classrooms, this item was not considered sufficient for scoring because the signs were limited to the location and not to the route. Similar results were also discovered by Gallo et al. (2011) who, when analyzing the conditions of 27 schools in the municipality of Chapecó, also found the absence of any signs for people with disabilities in their study and by Basei and Cavasini (2015), where of 20 schools analyzed 95% did not have any type of signage.

Schools would be considered signposted if they had Braille signs next to the doors and at the height of the hands, identifying the environments and signs in LIBRAS (MEC, 2009). The signs in LIBRAS was found in one of the schools (E3), identifying the door of a room as a computer room, however, as the place was used as a deposit, the school was not scored, because it was a casualty and not because it was adapted to this or any other type of signs, such as Braille. This result corroborates the findings of Gallo et al. (2011) who also did not find any type of signaling to people with disabilities in their study. As Manzini and Corrêa (2008) point out, the lack of some elements can intensify the disadvantages experienced by people with disabilities, since the lack of signage in Braille/LIBRAS makes it impossible for students with visual impairments to access different school' places.

That paths were considered illuminated when the schools had good light, including the corridors and stairs. Thus, the lighting was considered insufficient in two schools (E1 and E4) because they have corridors without windows and with few lamps, especially in schools that had vertical buildings, with more than one floor.

There are courses of considered free of obstacles when they were paved, with regular ground and free of obstacles (MEC, 2009). At school one, the internal routes were not free of obstacles, since the access corridor to the sports court had an uneven floor and a tree in its route. The presence of trees protected by some type of support or without protection had already been identified in the study by Corrêa and Manzini (2012) as one of the main types of obstacles most encountered on school routes. This fact stands out because, when planning accessible environments, attention must be paid to the location of each element, since, when poorly located, they hinder the passage and become obstacles for people with disabilities, especially those with visual impairments (MEC, 2009).

External access was considered adequate when the school street was paved, it had a pedestrian lane, lowered guides, nearby bus stop and Paved street/avenue, without holes, steps and/or impediments (MEC, 2009). At school five, although conditions that allowed greater accessibility to students were identified, such as the presence of a paved street and a bus stop near the school, it was noticed that repairs were not carried out on its infrastructure, due to obstacles (holes, earth and unevenness on the sidewalk) impair the free access of people with disabilities. According to Miron and Costa (2014), the lack of conservation of the sidewalk floor is often found. Castro, G. G. et al. (2018) they add that the lack of adequate conditions for accessibility not only restricts the participation of individuals with disabilities, but also impair access to an equal quality education, delimiting the development of their potential and improving the quality of life of these subjects.

This type of flooring would be considered appropriate if the school has a tactile map that represented the school's scheme (MEC, 2009). However, as only schools two and nine presented tactile flooring on a partial route, the criterion considered was to have this type of flooring on a total or partial route. At school nine, the Tactile flooring as inserted only from the entrance gate to the resource room,

reiterating the findings by Corrêa and Manzini (2012) who found few guidelines in the evaluated schools and in most of them, the lines were not present at all the observed path.

The non-slip flooring was considered adequate in the school that has this type of regular floor and in good condition (MEC, 2009) in partial or total route. Inside school four, there was a smooth and rough floor in the corridors facing the classrooms and in the other rough floors, demonstrating the scarcity of non-slip floors in the schools analyzed, found only in schools one and five.

The data found corroborate the study by Castro et al. (2018), Manzini and Corrêa (2008) and Corrêa and Manzini (2012), where this condition was found a little in the evaluated schools. The authors also ratify that most schools had rough and smooth floors and that “smooth floors can be dangerous for their students, as they can become slippery, especially when wet” (Corrêa & Manzini, 2012, p. 8), own translation.

The Proximity of access to the management team consists of the easiness of the student to contact it when necessary. Thus, the proximity was considered adequate when the rooms of director, vice-director and pedagogical coordinator were shared, being located next to each other or one in front of the other. The difficulty of access can contribute to the lack of participation of PAEE students in the school sector, however, six schools (E3, E9, E11, E12, E13 and E16) did not have a close management team.

### Classroom

Were items of analysis of that item: Airy room, Lighting, Low noise level, Room size, Areas defined by carpets and doormats, Furniture size and arrangement, Diversity of materials and Equipment needed for PAEE students.

**TABLE 3**  
*OBSERVED CLASSROOMS CONDITIONS*

ITEMS	CLASSROOM															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Airy room	0	1.0	0	0	0	1.0	1.0	1.0	0	1.0	0	1.0	1.0	1.0	1.0	1.0
Lighting	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0	1.0
Low noise level	0	0	0	0	0	0	0	0	0	0	0	1.0	0	1.0	1.0	1.0
Room size	0	0	0	0	0	0	1.0	1.0	1.0	1.0	0	1.0	1.0	1.0	1.0	1.0
Carpets and doormats	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Furniture size and arrangement	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Diversity of materials	2.0	2.0	2.0	0	2.0	2.0	2.0	0	2.0	0	0	2.0	2.0	2.0	2.0	2.0
Equipment needed	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
<b>SCORE</b>	<b>7.0</b>	<b>8.0</b>	<b>7.0</b>	<b>5.0</b>	<b>7.0</b>	<b>8.0</b>	<b>9.0</b>	<b>7.0</b>	<b>8.0</b>	<b>7.0</b>	<b>5.0</b>	<b>10</b>	<b>9.0</b>	<b>10</b>	<b>9.0</b>	<b>10</b>

Source: Elaborated by the author with the data observed in schools.

For analysis of this item, the manager who accompanied the researcher during the visit to the school established a classroom to be observed that was with the class in break or extra-class activity. In this category, the average of schools was 7.8 points. Three schools (E12, E14 and E16) fully met the items analyzed (10 points) and two schools had lower scores (E4 and E11, receiving 5 points each). However, it should be noted that item three (low noise level) was scored in schools (E14, E15 and E16) but these were not on school day.

The classrooms observed were considered airy when they had large windows (MEC, 2009) and doors located in open corridors. Of the 16 schools, ten were considered airy (E2, E6, E7, E8, E10, E12, E13, E14, E15 and E16). In spite of this, as the research was done in one room per school, due to the fact that most of collection was carried out during the school period, the conditions of the classrooms of the same school could be different, depending on their location.

Classrooms were considered to be lit when the classrooms had large windows that allowed for good lighting (MEC, 2009). However, as in (E15) depending on the time, the classroom lighting was extremely impaired due to the light. School 14 implemented a solution (painting window and door glass) in order to reduce this difficulty, due to the lack of adequate lighting, impairing the students' learning process (Tada et al., 2012; Castro, 2000). However, the solution adopted by the School can be detrimental to the learning of children from the opposite period, since the environment will be darker, so the use of curtains could be more useful for both classes.

Noises in the School environment were considered loud when the noise outside the classroom was greater than that in the classroom. This condition occurred in 12 schools (E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11 and 13) due to the fact that they have a fractional playgrounds according to the school year (each some school had three to four playgrounds per day) causing noises during class hours for those who were not in the interval at that time. The justification for such division refers to the number of students in the schools that would not be behaving all at the same time in schoolyards. In accordance with Calado (2006), noise can impair activities in the classrooms, therefore, it's essential that school' settings meet the basic requirements of environmental comfort, including minimum noise and adequate lighting for the quality of work to be carried out (Castro, 2000).

The size of the classrooms was considered good when the distance between the tables made it possible for students to move around without difficulty. Nine of the 16 schools analyzed met the criterion, contrasting the findings of Gallo et al. (2011), the 27 schools analyzed, 25 of them (92,59%) had large classrooms.

According to Teixeira and Reis (2012), the arrangement of u-shaped wallets allows a prominent position for the teacher and greater mobility, providing whenever necessary closer contact with the student, however, little found in the schools visited. Likewise, Roquejani et al. (2018) complement that in order to respond to the multiple diversity in the classroom, different strategies and ways of promoting teaching are needed, as well as different arrangements in the school physical space.

These areas were considered adequate when they did not have areas defined by carpets and/or doormats. According to Manzini and Corrêa (2008) the analysis of this item is important because carpets and doormats can be an obstacle to students or other people who circulate around the school, who can stumble, fall and get hurt. Therefore, as no school had this element found, all were considered adequate, as well as in the findings of Corrêa and Manzini (2012) and Corrêa (2010).

The size and layout of the furniture were considered adequate when they had furniture suitable for the age group of the children (MEC, 2009), with all schools meeting the criteria.

The Diversity of materials was considered adequate when the managers reported that it was sufficient (E1, E2, E3, E5, E6, E7, E9, E10, E12, E13, E14, E15 and E16). Among the materials found, the existence of materials of different shapes, colors, sizes, convenience and practicality such as Lego, teddy bears, dolls, educational games etc., more precisely in the first-year rooms, resource room or any other specific room for storage of school materials. Despite this, three managers indicated availability as insufficient (G7, G8 and G10) and three other managers (G8, G10 and G14) pointed out that schools lack adapted furniture.

The reality of the schools visited allows us to assume that the process of school inclusion is still under development. As an elementary assumption in the guidelines and laws that support this idea,

it is the availability of materials that meet the differences of students (*Decreto n. 7.611, de 17 de novembro de 2011*), but sometimes the resource to assist this student does not reach the school he needs. This situation is aggravated when school representatives said they did not know whether or not there was an adapted portfolio, and the schools they did have had no students using them.

Despite the complaint of the lack of availability of adapted materials in some schools, it was observed the commitment of these professionals to attend and offer better care for this students. According to the speech of G.10, to be able to change the diaper of a student in a wheelchair, the school had to rely on the donation of a teacher's table from another school and adapt with a mattress, in addition, it did not have a wet tissue, glove or other resource so that they could carry out exchanges and cleaning.

The necessary Equipment was considered adequate when the managers informed that the school had enough to serve the PAEE students, even if limiting this equipment to multifunctional resource room (SRM). Among the highlighted equipment are: computers, common printer, multifunctional printer, magnifying glasses, games in Braille, materials in Braille and LIBRAS, softwares, ball with rattle etc., as established in laws (*Política Nacional de Educação Especial na Perspectiva da Educação Inclusiva, 2008; Decreto n. 7.611, de 17 de novembro de 2011*). All schools were scored in this item.

### Refectory

Were items of analysis of that item: Size of table and chairs, Distance between furniture, Number of children per table, Utensils in good condition and Need for the child to wait for the table.

**TABLE 4**  
**CONDITIONS OF REFECTORYS**

ITEMS	REFECTORY															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Size of table and chairs	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Distance between furniture	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0	2.0	0	2.0	2.0	2.0	2.0
Number of children per table	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0	2.0	0	2.0	2.0	2.0	2.0	2.0
Utensils in good condition	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Need for the child to wait for the table	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
<b>SCORE</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>8.0</b>	<b>8.0</b>	<b>8.0</b>	<b>8.0</b>	<b>10</b>	<b>10</b>	<b>10</b>

Source: Elaborated by the author with the data observed in schools.

It was observed that the schools refectories were either in specific places, closed or in the schoolyard itself. The average of schools in this category was 9.5 points. Twelve schools received maximum scores (10 points) and four of them (E9, E10, E11 and E12) 8 points.

The sizes of tables and chairs were considered adequate when they had dimensions that would allow their use in comfort (MEC, 2009) when compared to the size of children. All schools met the criteria.

The distance between furniture was considered adequate when it was observed that it was possible to circulate and to maneuver a wheelchair between the tables in the refectory (MEC, 2009). For Calado (2006) the ideal distance between the tables must be 1.20m and their arrangement must be orthogonal with positioning at right angles. In two schools (E10 and E12), the number of children per tables assessed was inadequate due to the arrangement of tables and

benches, which had a tight configuration in relation to the available space and hindered the circulation and accommodation of students with disabilities.

The number of children per table was considered adequate when students were able to accommodate themselves in a distance that allowed free movement of the arms to carry out the meal. However, in two schools (E9 and E11), the number of children per table was assessed as inadequate. The accessible architectural project must be concerned with the number of users that will use the environment, since that number may increase over time (Evangelou, 2014).

The utensils were considered to be in good condition when they were not deteriorated, broken or dirty. Most of the utensils used by schools were plastic, but all of them were found to be in good condition. However, it is noteworthy that for students with disabilities, many of the utensils to be used must have adaptations, such as spoons with angled handle, plate with suction cup holder, glass with two handles, etc (Calado, 2006) in order to provide students with disabilities with better conditions when it comes to food. These adaptations, in the field of assistive technology, are simple and inexpensive, but almost always difficult to find.

The child's need was considered met when reported by the managers. It was found that in all schools they were attended to according to their needs. According to them, students without disabilities lined up to get their food or as observed at school (E13), the children themselves were the ones who served themselves, allowing autonomy and independence to the student, in addition to making him/her aware of the waste, because each one used as much as he/she intended to eat.

Evangelou (2014) when analyzing the conditions of 48 schools in the municipality of Viçosa, Minas Gerais, he made on-site visits to check the accessibility conditions of three schools that had students with disabilities, considered accessible by the Department of Education or by their leaders. Among the items evaluated in the three schools considered accessible in the study, only one had a refectory with satisfactory dimensions for the use of children because the spaces were considered small for the number of children or their tables, and chairs were very high.

### Other resources

Were items of analysis of that item: activities designed on the floor, posters or mural with works, stage, video room, library, elevator, different activities and playground.

**TABLE 5**  
**OTHER SCHOOL RESOURCES**

OTHER RESOURCES																
ITEMS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Activities designed on the floor	1.0	0	0	0	1.0	0	0	0	1.0	0	1.0	0	1.0	1.0	0	0
Posters or mural with works	1.0	0	0	0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Stage	1.0	0	1.0	0	1.0	1.0	1.0	0	1.0	1.0	0	1.0	1.0	1.0	0	1.0
Video room	1.5	1.5	1.5	0	1.5	1.5	1.5	1.5	1.5	1.5	0	1.5	1.5	1.5	1.5	1.5
Library	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Elevator	0	0	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0
Different Activities	0	0	1.5	0	0	1.5	1.5	0	1.5	1.5	0	1.5	0	0	1.5	0
Playground	1.5	0	1.5	0	0	1.5	0	0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
<b>SCORE</b>	<b>7.5</b>	<b>3.0</b>	<b>7.0</b>	<b>2.5</b>	<b>6.0</b>	<b>8.0</b>	<b>6.5</b>	<b>4.0</b>	<b>9.0</b>	<b>8.0</b>	<b>5.0</b>	<b>8.0</b>	<b>7.5</b>	<b>7.5</b>	<b>7.0</b>	<b>6.5</b>

Source: Elaborated by the author with the data observed in schools.



In this category, items that were present at school were scored. The average of schools in this category was 6.4 points. School four received the lowest score (2.5 points) and school nine received the highest score (9.0 points). The library item was found in all schools and therefore, all were scored, while the elevator items was only scored in school four.

Activities designed on the floor were found in five schools (E1, E5, E9, E13 and E14). These activities were: hopscotch, snail and checkerboard.

The activities developed by the students were found on posters or murals from 13 schools (E1, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, E 15 and E16).

The Stage was part of the schoolyard of eleven schools (E1, E3, E5, E6, E7, E9, E10, E12, E13, E14 and E16). However, some only allowed access using stairs. On the other hand, the School (E6) even had the installation of a “Adapted Stage” sign, received in 2013.

The video room was identified in 14 schools (E1, E2, E3, E5, E6, E7, E8, E9, E10, E12, E13, E14, E15 and E16), considering schools that had specific infrastructure and a video cart itinerant, were the activity took place in the classroom itself.

In all schools, libraries are found, despite differing in a comfortable and tight environment, they refuted the country’s average presented by the 2017 School Census, where a library and/or reading room were present in 54.3% of elementary schools (MEC, 2018).

Of the sixteen schools visited, fourteen were single story. However, the elevator was only present in one of the two school houses (E4), which in turn used a rented building (former pre-university entrance exam school) while waiting for the renovation of the city hall building.

As a criterion for scoring this item, there were schools that reported offering extra-class activities to their students (E3, E6, E7, E9, E10, E12 and E15). These were the activities promoted by the schools: music class (guitar, flute), dance class (capoeira), computer class, chess, capoeira and school band, offered at school hours in an optional way to those interested.

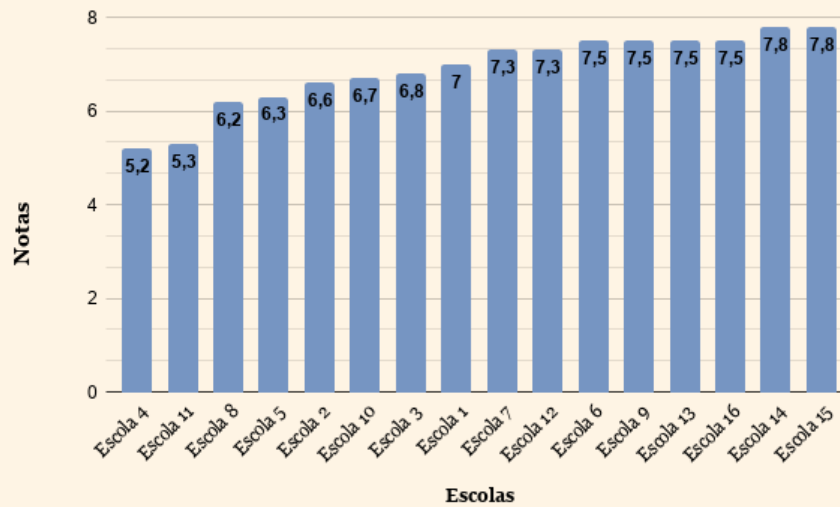
The playground was considered to be present in schools that had a place with at least one toy and sandbar, to be under maintenance and/or to have a partnership with EMEI. Disabled playgrounds were excluded from the score. The item stood out in eleven of the 16 schools of the evaluated schools (E1, E3, E7, E8, E9, E10, E11, E12, E13, E14, E15 and E16), covering 68% of them and standing out above the average of the country which is 27.5% (MEC, 2018).

However, as highlighted by the G10, even though the school has a playground, no toys were adapted for students with disabilities. As Carvalho (2008) states schools should provide toys that allow the use of people with disabilities, with articulating seats and firm, non-slip material, without sharp edges and arm support (depending on the toy), handrails, guardrails, etc. The ideal floors in these places should be non-solid, such as earth, grass and sand, as they serve to cushion falls on slides, among others. Just as you should choose synthetic grass, rubber flooring or another that allows access by a student using a wheelchair (Carvalho, 2008).

### General analysis of schools

After the analyzes by category, a general analysis of the schools was carried out, according to the scores shown in Graph 1.

**GRAPH 1**  
FINAL CLASSIFICATION OF SCHOOLS



Source: Elaborated by the author with the data obtained by the *script for the observation of physical space and inclusive resources in the school context*.

The analysis of the physical infrastructure by the *script for the observation of physical space and inclusive resources in the school context* resulted in an average of 6.8 points. School four had the lowest score (5.2 points) and school fourteen and fifteen the highest (7.8 points), diverging by 2.6 points. For infrastructure classification, schools with scores between zero and 5.0 were considered inadequate, from 5.1 to 7.9 partially adequate and from 8.0 to 10 adequate. Therefore, when considering the dimensions analyzed in the schools and the lack of some essential items, all sixteen schools, including school seven, built after elaboration of the 2009 accessibility manual, were classified as partially adequate to serve PAEE students (E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, E15, E16), demonstrating the need for adjustments and/or adaptations of such settings in order to achieve full inclusion of all students.

However, the analysis carried out took into account the modifications that would be necessary to attend the PAEE in general, in other words, that should serve everyone regardless of their characteristics. Thus, schools may be partially suitable for students enrolled in them, but not necessarily adapted to other. Thus, schools may be partially suitable for students enrolled in them, but not necessarily adapted to other students from PAEE who may become part of them.

The results obtained with the sum of the scores of each school refute the managers' standpoint on the condition of the school infrastructure, since of the 16 managers, 43.7% (n = 7) declared the physical infrastructure as satisfactory (G2, G4, G6, G8, G11, G12, G13), 43.7% (n = 7) declared the physical infrastructure as inadequate (G1, G3, G5, G7, G10, G14, G15) and, 12.5% (n=2) considered it appropriate for the PAEE students already attended (G9, G16).

According to the managers, schools with satisfactory physical infrastructure stood out for the adaptations that schools have made for the elimination of obstacles, acquisition of materials, software and laptops. In this way, it can be assumed that schools that are not necessarily seen as fully adequate, due to the adaptations and resources they have received, considered that the infrastructure meets the needs of this school audience. On the other hand, schools with inadequate physical space still lack adaptations, such as: changing the school plan, expanding and improving the physical infrastructure, greater availability of material resources and a greater offer of adapted materials.

In addition, it was observed that schools still need a non-slip and tactile flooring, better signage, elimination of obstacles, expansion of doors, expansion of school infrastructure, greater availability of material resources and adapted materials, especially in the common room. However, in all of them, at least fourteen items or more adapted to students with disabilities were found.

## Final considerations

With the growing need to serve all students, regardless of their characteristics, this study aimed to verify the conditions of the physical infrastructure of schools in a Municipal System of Elementary Education, considering PAEE students.

The results of the *script for the observation of physical space and inclusive resources in the school context* made it possible to classify the 16 schools as partially adequate to serve the students, refuting the standpoint of the managers about the condition of the school infrastructure since the 16 managers, 43.7% (n = 7) declared the physical infrastructure as satisfactory, 43.7% (n = 7) declared the physical infrastructure as inadequate and, 12.5% (n=2) considered adequate for PAEE students already attended. However, the main points to be improved were: the expansion and improvement of the physical infrastructure, greater availability of material resources and adapted resources mainly in the common class.

As limitations of the study, the impossibility of identifying the needs of adaptations of schools to each PAEE student due to the choice of the instrument is highlighted. It is suggested that the next researches make it possible for school managers themselves to complete the *script for the observation of physical space and inclusive resources in the school context* so that they can identify what is the view of these subjects is in relation to the quality of the school observed, comparing it with the observation script filled out by the researcher herself. Thus, it is believed that the recognition of such data is of fundamental importance for each school and the Municipal Education System to be able to outline an action plan to think about the short, medium- and long-term adaptations for each one, starting with more commitment. Furthermore, the results found support other researchers that, when analyzing the conditions of the school infrastructure, it was found that no school was adapted in all the evaluated items, making the accessibility conditions still unfair.

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#### Note on authorship

This article is a cutout of the master's thesis *From physical infrastructure to pedagogical practices: school challenges facing the target audience of special education* developed by the first author Camila Elidia Messias dos Santos who was responsible for the collection, description and analysis of the data guided by the second author Vera Lucia Messias Fialho Capellini who participated in the data analysis and article review.

#### Data availability statement

The authors do not provide the data for this research, as new studies are still being developed. Therefore, after the end, the data may be made available by consulting the authors.

#### How to cite this article

Santos, C. E. M. dos, & Capellini, V. L. M. F. (2021). School inclusion and physical infrastructure of elementary school. *Cadernos de Pesquisa*, 51, Article e07167. <https://doi.org/10.1590/198053147167>

Received on: FEBRUARY 29, 2020 | Approved for publication on: OCTOBER 13, 2020



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