The architecture of learning spaces from the perspective of Herman Hertzberger

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Abstract:

Herman Hertzberger is an architect who has dealt over many years with the design of school buildings, both in terms of theory and practice. Owing to his vast experience in this field, he has established a theoretical framework on designing stimulating learning spaces for children. The scope of this thesis is firstly to present Hertzberger's theory on the attributes of such spaces and how architects can achieve designing successful school buildings. There are several remarks of his that can be achieved spatially in various manners. After all, in architecture there is not an unambiguous relationship between theory and practice. In this sense, the research question of the present thesis is how Hertzberger's theory on designing school buildings has been implemented in different ways. In other words, I will try to display the various architectural 'solutions' manifesting the same principles. In order to answer the question above, I will analyse schools (kindergartens and primary schools) designed by Hertzberger to serve contemporary learning approaches and teaching practices. The schools that will be selected cover a large time span, starting from the first buildings he designed until recent projects; the objective is to understand in what ways he himself has implemented his own ideas and probably detect elements that he further developed or departed from.

Contents:

Introduction

The architecture of learning spaces, although a rather interesting field, is very challenging. Contemporary schools need to align to the contemporary pedagogical approaches that call for innovative design solutions, far from the ones that were dominant a few years ago. The wide recent literature on the topic is something that reveals the degree to which architects are concerned with it and is, undeniably, hopeful.

However, Herman Hertzberger is one of the architects who has been designing schools for over fifty years now and is widely known about his work. He has written the book “Space and Learning”, published in 2008, where he elaborates in detail on the design principles of school buildings unveiling his vast experience on the field. In that regard, it is truly fascinating to comprehend how he has implemented these principles in his designs over the years in order to firstly, explore the correlation between the theory and the practice and secondly, to find out the various ways that these principles can be spatially manifested. Thus, for the scope of the present thesis four schools designed by Herman Hertzberger were selected and analysed. The selection was based on two criteria; the schools had to cover a large time span and be located within a reasonable distance so that I could visit all of them. The latter was of high significance; looking at the plans of several schools designed by Hertzberger, I soon realised that the physical space was too rich to be able to fit in and be comprehended through two-dimensional representations. This was when it became clear that only be personal visits to the schools a deep understanding of their architecture could be achieved.

The methodology adopted consists of the following steps: studying the theoretical framework that Hertzberger suggests and getting familiar with the language he uses and the terms he introduces, then proceeding with visiting the schools and finally reflecting on the four school’s designs based on my personal experience in the buildings as well as my perspective as an architect, together with the architect’s own intentions and reflections on each of them.

The structure of the present paper includes the introduction, two chapters that constitute the main body of the paper and the conclusion. The first chapter demonstrates the principles suggested by Hertzberger so that one is able to understand them in spatial terms, as well as a recent literature review on the architecture of schools that helps the reader to comprehend and position the topic in a broader context. The second chapter consists of the analysis of each of the four schools and a

comparison made in the end where a few similarities but also differences are identified. It should be noted that despite the fact that the schools cover a wide period of time, conclusions about any design evolutions are not easy to be adduced due to noticeable differences related to their typologies (villa-style or linearly developed, spread over one or more floors) and programmatic goals (the Montessori schools are associated with certain demands, the newest building, being an extended school, hosts more than one schools as well as neighbourhood oriented facilities). Finally, the conclusion summarises the main points and findings of the thesis.

Chapter 1.
Contemporary learning approaches and perception of learning spaces call for an appropriate design.

1. Herman Hertzberger's theoretical framework

1.1. How did it all begin?

Herman Hertzberger advocates that one's childhood years influence their entire life and attitude. He himself grew up in a beautiful neighbourhood in Amsterdam where he would play outside without any restrictions. The first school that he attended was also very crucial to his later development; it was a Montessori school in Amsterdam which, in an interview he gave in 2015, described as "fantastic" (Hertzberger, 2016). It was not only the building itself but also the pedagogical approach that had a great impact on him; the teachers, instead of guiding the children, offered them freedom and through discussion and exploration, they would be involved in things that inspired them.[1] These experiences were clearly valuable for his way of thinking and designing as an architect, especially for an architect being evolved with school buildings to such an extent.

Hertzberger's graduation project at the Delft University of Technology (1958) was a secondary school under the guidance of Duintjer, an architect whom he admired a lot. Even though, looking back at his design, he is hardly satisfied with it, the very choice of it should reveal his interest in the issue. He says: "The high school was not my best design. It was a good building, but it was also extremely clinical and factory-like. It was an impersonal design, not a plan that I think back on with pleasure.[2]"

As a young architect, he was a member of the editorial board of the Dutch magazine 'Forum voor architectuur en daarmee verbonden kunsten (Forum for architecture and applied arts)' together with Aldo van Eyck, Bakema and others from 1959 until 1963. He considers this period as a postgraduate education for him.[3] It is quite interesting to see that some of his fundamental ideas on architecture were formulated 60 years ago; for instance, the notion on polyvalency versus flexibility (Hertzberger, 1962) and the as many as possible variable interpretations of the form (Hertzberger, 1967).

It was because of his wife being a kindergarten teacher that he was proposed to build a school in Delft soon after he had finished his studies. That would be his first implemented school design, the

1 https://architectureandeducation.org/2016/02/03/interview-with-herman-hertzberger/.
2 https://www.hertzberger.nl/index.php/en/biografie/tijdlijn.
3 See footnote 2.

Montessori School at Delft (1960-1966). His prior and very first project was a students' house in Weesperstraat, Amsterdam (1959-1966).

Undoubtedly, Hertzberger's influences on designing schools must have been numerous throughout the years. Even though he states that the open-air schools built during the first decades of the 20th century did not aim in changing the established education rules and the typology of the interior space that served them, he does recognise that they introduced aspects that pushed further the development of the architecture of schools (Hertzberger, 2008), such as the use of extended glass facades that offered transparency, light, openness and views or the use of folding partitions that opened up the classrooms to the exterior. In fact, in his book "Lessons for students in architecture" published in 2016[4] we can even see how he was influenced particularly by Duiker's Open Air School in Amsterdam in "opening up corners where wall and ceiling meet"[5] (Hertzberger, 2016). The use of folding partitions is another element that he later adopted in his designs, in the in-between space of classrooms and corridors or classrooms themselves.

In a recent interview of 2015, he explicitly said that the architect who really influenced him was the German architect Hans Scharoun (1893-1972),[6] mainly because of his ideas behind his school designs and his attempt to express spatially innovative thinking regarding educational approaches (Hertzberger, 2008). It should me mentioned that in "Space and Learning" Hertzberger cites several other schools, by which it is likely that his thinking was influenced to a small or large extent.

1.2. Presentation of Herman Hertzberger' s principles

Herman Hertzberger's thinking and ideas about the design of schools are actually the same with those regarding architecture generally. It is just that the implementation of his principles particularly in school buildings are really important due to fact that the users of space are children. In fact, the design of such spaces should enhance learning process by expressing spatially contemporary learning approaches. After all, as Hertzberger supports, architecture is not about thinking mainly in forms, but rather, after having thought of the context and the idea that an architect wants to express, they should try to find the appropriate shapes in order to realise their vision (Hertzberger, 2000). In this sense, it becomes apparent that the architecture of schools is of high significance, in that "the riches of the learning environment are so dependent on the space they occupy" (Hertzberger, 2008).

4 This book contains elaborated versions of parts previously published in *Ruimte maken, ruimte laten* (Making space, leaving space), 1984 and *Uitnodigende vorm* (Inviting Form), 1988.
5 See chapter 2: Montessori School, Delft.
6 https://architectureandeducation.org/2016/02/03/interview-with-herman-hertzberger/.

Herman Hertzberger formulates several design principles that should be taken under account when designing a school. Each of them will be briefly developed here, so that they all become explicit from an architectural point of view.

1.2.1. Articulated space

The articulation of space refers both to the classrooms as well as to other spaces, such as halls. According to Hertzberger, a space which shape is regular, for instance a rectangular classroom which he defines as ‘basic’ and ‘unarticulated’ (Hertzberger, 2008) is suitable only for group-working under the supervision of the teacher. On the contrary, with an irregural or ‘articulated’ classroom several corners are created were children can work individually or in smaller groups simultaneously. The more such spaces are created, the more the differentiated learning environments (Hertzberger, 2008). The degree, together with the way that space is articulated determines whether the space will be used individually, by small groups or by a larger group (Hertzberger, 2016). The spatial means with which articulation can be achieved, vary; from walls of full or half height to steps, raised or lowered floor parts (hollows), bay windows or recesses (Hertzberger, 2008; 2009) to built furniture (Hertzberger, 2008). However, Hertzberger points out that in any case the unity of the whole should not be lost; space should not be fragmented (Hertzberger, 2000; 2008; 2009). This means that visual connections between those spaces are present (Hertzberger, 2008) and spatial cohesion should be ensured with a communal space (for instance an entrance, a hall or an interior ‘street’) from where children can see and access the several space units (Hertzberger, 2009). The significance of visual connection can be comprehended by the following phrases: “The architect is not only a builder of walls, he is also and equally a builder of openings that offer views. Both – walls and openings – are crucial” (Hertzberger, 2016).

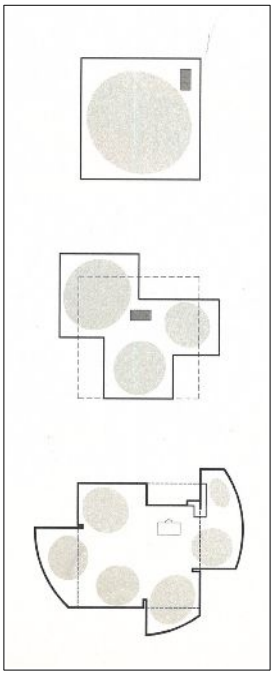


Image 1. Articulated (middle, down) and unarticulated (up) space (Hertzberger, 2009).

1.2.2. “From corridors to learning streets” – “Threshold space”

According to Hertzberger, “corridors do not belong in schools” (Hertzberger, 2009). Instead of reserving space which is used merely for circulation purposes and hanging coats, this space should rather function as an extension of the classrooms and as a meeting place for students (Hertzberger, 2008) , a place where they can do things that they cannot do in classrooms, for instance collective activities for a large number of children or working in smaller groups in differentiated workplaces (Hertzberger, 1984; 2009). The idea behind this is to make as many as possible various workplaces, so that the entire school can function as a ‘learning environment’, with the broader sense (Hertzberger, 2008). In fact, Hertzberger goes as far as to say that in ‘modern schools’ an ‘open learning landscape’ is created through the disappearance of classrooms, while he himself recognises the difficulties that emerge when all-around activities are held at the same time due to disturbance (Hertzberger, 2008). Spatially, the above can be realised for instance by designing niches and placing tables and other elements that evoke a working atmosphere outside the classrooms, challenging and inviting children to work there (Hertzberger, 1984) or with the use of glass foldable partitions, thus separating or connecting the classrooms with the space outside according to the needs (Hertzberger, 2009). Efficient lighting of this space is a prerequisite towards this direction, as well as the placement of coats and personal belongings in another place out of sight (Hertzberger, 2008). It is this threshold space between classrooms and corridors or communal halls, the in-between space, which facilitates the transition and connection between them and are equally usable from both sides (Hertzberger, 2016).

1.2.3. “The school as a city” – “The social space”

Hertzberger believes that “buildings should be interpreted as cities”, in that they should be organised around a ‘street’ or ‘square’ that is more public and functions as an urban street from which the ‘buildings’, the more detached spaces, can be accessed (Hertzberger, 2000). In schools, particularly, the implementation of this principle enhances students’ socialisation due to the large number of meetings, confrontations and adventures that are likely to occur in this public realm (Hertzberger, 2000; 2008). Considering that nowadays the development of social skills is equally important to other traditional subject matters (Hertzberger, 2009), the latter is of high significance. In fact, Hertzberger advocates that collective should unquestionably prevail over the private, however how complementary components they are (Hertzberger, 2000). In addition, he highlights that a large collective area in schools is necessary, especially in schools where there is a wide range of facilities, for instance after-school activities, and / or facilities related to the local community (Hertzberger, 2009). “It is social contact that turns collective space into social space” (Hertzberger, 2000), hence encounters should be enhanced as much as possible by a variety of spatial means; intentionally designed visual connections, intersections of circulation routes and places for temporal stay, the use of voids and bridges, differentiated lighting conditions (e.g. light and dark places, daylight from above) and the purposeful use of height (higher spaces evoke the feeling of togetherness) are some of the fundamental ones (Hertzberger, 2000; 2008).

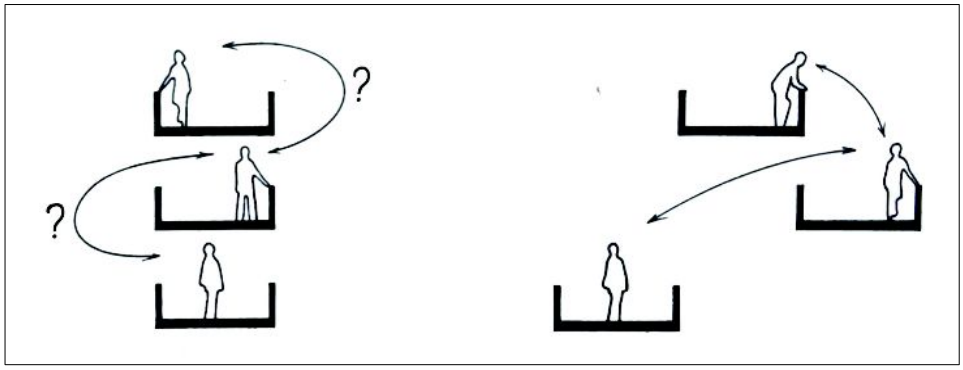


Image 2. Visual connections enhance socialising (Hertzberger, 2000).

1.2.4. “The school as a home”

Despite its city-like organisation, a school should also constitute a familiar and hospitable environment, providing ‘nests’ where children can fall back on[7] (Hertzberger, 2008; 2016). Children should feel safe and have the feeling of belonging; with this as a base, they can then “venture to explore the world” (Hertzberger, 2009). The classroom, which has been over time the main facility

7 Hertzberger (2008) mentions that children who attend primary school have a greater need for this, comparing to those who go to secondary school. It is safe thus to assume that this need is even stronger at an earlier age as well.

of school buildings, is able to provide this safety and security that children need (Hertzberger, 2008). However, nowadays, that the entire school might function as a learning environment and classrooms lose part of their hegemony, other spatial solutions need to be implemented in parallel (Hertzberger, 2008). However how contradictory the concurrent existence of a ‘learning landscape’, meaning a challenging environment, and that of a familiar territory might seem (Hertzberger, 2008), it can in fact be achieved with clarity in spatial organisation and the ability of users to inhabit the space; the building’s main structure, should be clearly defined and identifiable and offer users the potential to inhabit it, to feel at home. This structure expresses the city-like organisation, but at the same time it is designed so as to accommodate and adapt to the users’ various needs preferably without undergoing changes[8], for instance by incorporating fixed “inviting elements”, which renders it into a familiar environment (Hertzberger, 2000; 2008; 2009; 2016). This leads us to what Hertzberger calls ‘the space of place’ (Hertzberger, 2008); “Place is where you recognise yourself, something familiar and safe, specially for you. … Space, whatever its purpose, can come to mean place, whether for individuals or for small or larger groups” (Hertzberger, 2000). The more responsible for and free to appropriate and use a space according to their needs its users are, the more they become inhabitants (Hertzberger, 2016).

1.2.5. “The space of form” - “Form and interpretation”

The above can be realised spatially by what Hertzberger defines as ‘space of form’ (Hertzberger, 2008; 2016). According to this notion, the design of schools should be less two-dimensional so that the capacity of space to contain is increased as much as possible. For instance, low-height walls or partitions can function also as shelves or cupboards; floors, ceilings and walls, which are essential parts of a building, should be rather treated with more creativity as three-dimensional elements that invite people to engage with them (Hertzberger, 1984; 2008). The more the capacity of form, the more meaningful and adaptable the latter becomes in several circumstances and, consequently, the more people become inhabitants of the space (Hertzberger, 2008). Hertzberger emphasizes that architects should not waste any space, but rather create space even in places that are less noticeable, between things for instance, because in this way the functionality of the space can be increased (Hertzberger, 2016). After all, the way that people associate with things differs according to their own experiences, needs, desires and the given situation. Hence, the more associations a space can evoke, the more people will be associated with it (in space and time) and thus appropriate the space (Hertzberger, 2000; 2016). Considering the creativity and the unexpected ways in which children

8 Hertzberger (2008) points out the difference between leaving a space bare, following the well-known phrase “less is more” and designing it in a way that allows for multiple uses and interpretations. We could entitle the latter ‘flexible by design’.

use the space, as well as the demand for a rich learning environment, it is quite easy to understand the significance of this design aspect. For, as Hertzberger says, people use the space in ways that the designer might have never thought about (Hertzberger, 2016) and even ordinary elements such as parapets, railings, stairs might actually be multi-functional in that they stimulate people for temporal usage other than their formal one (Hertzberger, 2016). In this context, the meaning of form is constantly shifting and the absence of specific meanings might lead to “more and ever new meanings” (Hertzberger, 2000).

Image 3. The space of form: Outdoor staircase in Apollo schools in Amsterdam (Lüchinger, 1987).

1.2.6. “The playground as street”

Schoolyards in traditional schools, Hertzberger says, are all about a large paved surface around the school building where children basically run and release their energy. Contrary to that, Hertzberger advocates that the outdoor space should fall in the sphere of education because “you can learn just as much outside as inside” (Hertzberger, 2008); not only children can be involved with water and other natural elements but also, subjects related to the natural environment (biology, geology, ecology etc) can be better enjoyed outside (Hertzberger, 2008). What seems to have a high importance for Hertzberger, though, is the social role of schoolyards which can be promoted and encouraged by certain design attributes[9] (Space and Learning, 180). He for one believes that schools’ outdoor space should be open to the entire neighbourhood, and not protected behind fences, become part of the street and enhance social cohesion in a larger scale (Hertzberger, 2008; 2009).

9 He does not elaborate much on this on a theoretical basis but, when writing about the schools he has designed, he does refer to how the outdoor space has been treated.

Image 4. The playground as street, Delft montessori school (Lüchinger, 1987).

1.3. Literature review

As far as the general approach of other architects, designers and theorists on the topic is concerned, the great impact of a well-designed school environment on children together with an innovative pedagogical system that matches it is broadly recognised. In fact, recent research has proved that the physical space affects the learning outcomes to a great extent (Hudson & White, 2020[10]). Even though we can distinguish certain characteristics of children according to their age and thus different childcare needs (Kotnik (Ed.), 2017) which should not be neglected during the design process (Dudek,[11] 2007), there is the common acceptance that an enriching and stimulating environment which offers learning spaces suitable to various activities and promotes socialisation is in any case needed. Socialising has turned out to become an essential skill that children will need in the future, just like academic knowledge (Hudson & White, 2020).

In recent years, the focus has been shifted to personalised learning, where each student should have the freedom to discover their personal interests and talents (Hudson & White, 2020); this is way far from the traditional learning approach, where the teacher would give lectures to a large number of children in an instructive way, and demands changes in the spatial design of the learning environment as well as in the teacher's approach and role. The inextricable relationship and agreement between the three components of pedagogy, the curriculum and the physical space is regarded as a prerequisite in order to achieve a progressive and effective learning environment (Lange, 2018; Hudson & White, 2020).

Nevertheless, children do have different needs depending on their age which call for certain design considerations. For instance, children attending a kindergarten environment have a few or even any social preconceptions, so there is the need to develop their innocent and free spirit. Also, it is just the right age for the development of all sensory organs, as children still do not have the skills to express themselves and communicate verbally (Dudek, 1996). Since children of that age are not supposed to be formally educated, the emphasis should rather be on learning through play (Dudek, 2007). Howbeit, the sense of belonging should not be neglected (Hudson & White, 2020). Designwise, the above call for both quiet and intimate spaces (corners, niches) as well as more dynamic spaces that offer various stimuli and can be used for several activities. Moreover, washrooms, lavatories, the kitchen etc. should be welcoming, bright and calming spaces, adapted to

10 In this book, the forward of which is written by Herman Hertzberger, there are quite many similarities to the theoretical framework that the latter suggests.

11 Mark Dudek is an architect who has been working on the design and research of school environments.

children's size, as they contribute to the individual development and sense of autonomy but also to socialisation and cooperation among their peers (Dudek, 1996; Kotnik (Ed.), 2017).

Regarding the design of primary schools, there are a few differentiated demands that arise from the difference in children's general stage of development and the education's curriculum. These include: Specialised learning environments, such as art studios, gymnasiums, libraries or even spaces destined for every child to find out their special interest, break-out spaces, well connected, that enhance collaborative and project-based work (ideally every space of the school should be designed for this purpose) and multi-functional spaces that allow for large gatherings, different types of activities and are able to accommodate activities concerning the local community (Dudek, 2007; Hudson & White, 2020). Access to the outdoor space should not be disregarded, as it is of vital importance for children's health and development (Hudson & White, 2020). At the same time, however, the significance of the classroom as the student's domain is acknowledged (Dudek, 2007; Lange 2018), although it might need to acquire a different role in the 21st century schools (Hudson-White, 2020). On the whole, in the context of a primary school Hudson and White support that the interaction and cooperation between children has a leading role in the learning process (Hudson & White, 2020).

With that said, the literature on the topic is wide and touches upon several issues; the spatial layout of the buildings, the importance of colors, materials and textures – especially for kindergartens (Dudek, 1996; Kotnik (Ed.) 2017) -, the relationship with the outdoor space and nature, the significance and effect of both natural and artificial lighting on space perception and learning performance (Dudek 1996 and 2007; Collective, 2020), but also the need of socialising, playfulness, the right balance between freedom and safety, to name a few (Dudek 1996, Exley & Exley, 2007). Sustainability of school buildings, which undoubtedly calls for a special analysis since it is multi-faceted, as well as the integration of technology into the learning environments are two other aspects often mentioned (Dudek, 2007; Kotnik (Ed.), 2017; Collective, 2020; Hudson & White, 2020). To wit, practical issues, even though important, are not the only ones that should be taken under account. Instead, there should be a great concern on how children will best evolve in the school environment (Dudek, 1996). Besides, "contemporary pedagogy considers everything, from drawing a picture to using the bathroom" (Kotnik (Ed.), 2017).

It is worth noting that Herman Hertzberger is often mentioned in literature, mainly in relation to his first designs (Montessori School in Delft, Apollo Schools in Amsterdam).

Chapter 2.
Analysis of schools designed by Herman Hertzberger.

2.1. What is the spatial implementation of the above principles in each school?

2.1.1. Montessori School, Delft, NL, 1960-1966

This is the very first built school that Herman Hertzberger designed. It accommodates a Montessori[12] primary school and kindergarten. Since 1966, the building has undergone several extensions, the last of which was realised in 2009-2011. Although it would probably be interesting for one to study the extensions and modifications of the building, for the scope of this essay this is regarded and analysed as a whole.

Hertzberger designed this school in accordance with the principles of the Montessori method, some of which are: emphasis on individual learning on self-chosen activities that often demand different levels of concentration and should be able to happen simultaneously without distractions, children taking care of their environment and developing independence (Hertzberger, 2008; 2016) and a different, non-static and unfixed relationship between the teacher and the students (Hertzberger, 1969).

12 Montessori is a method of education formulated by Maria Montessori. It is based on individual development and freedom, with respect το children's needs according to their age (the education of the individual).

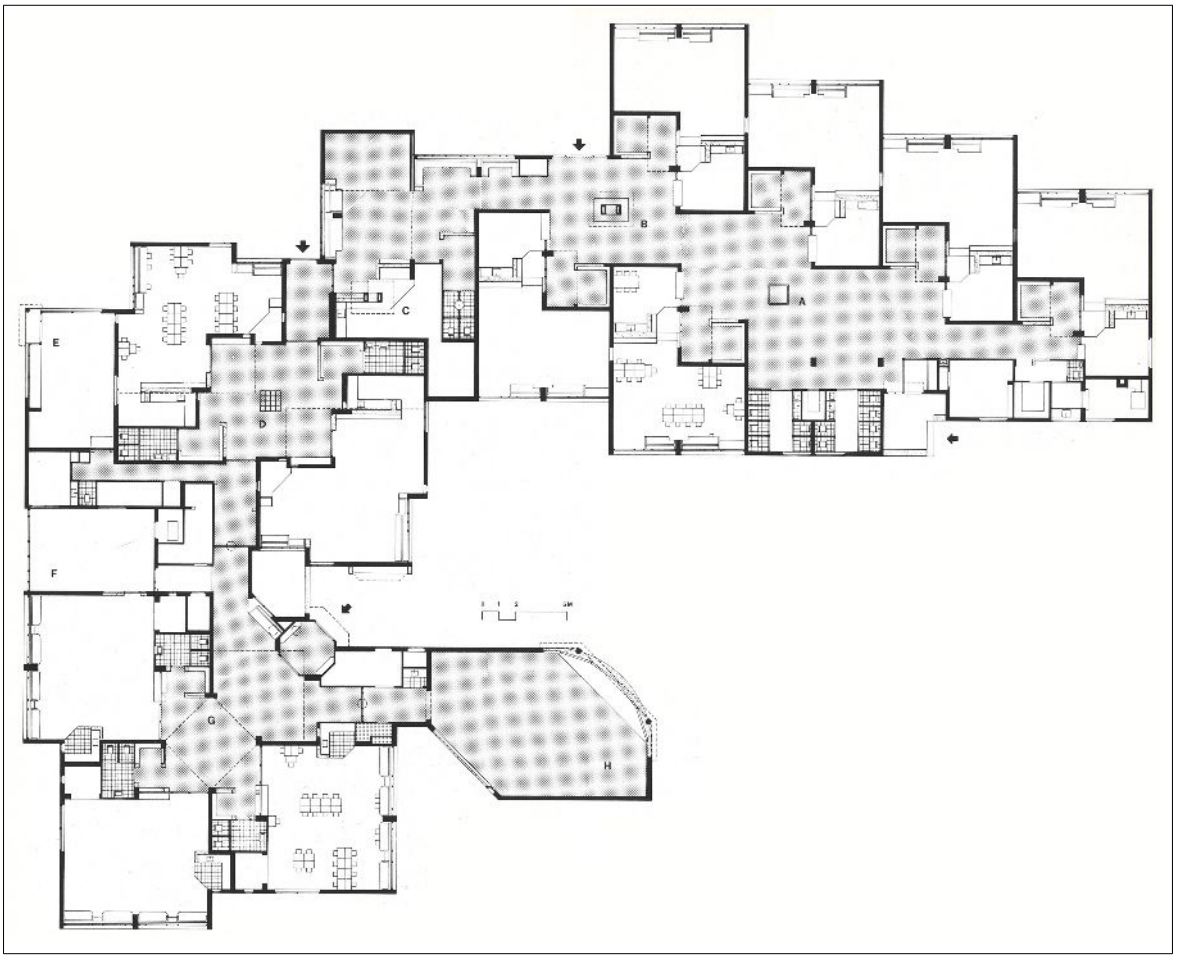
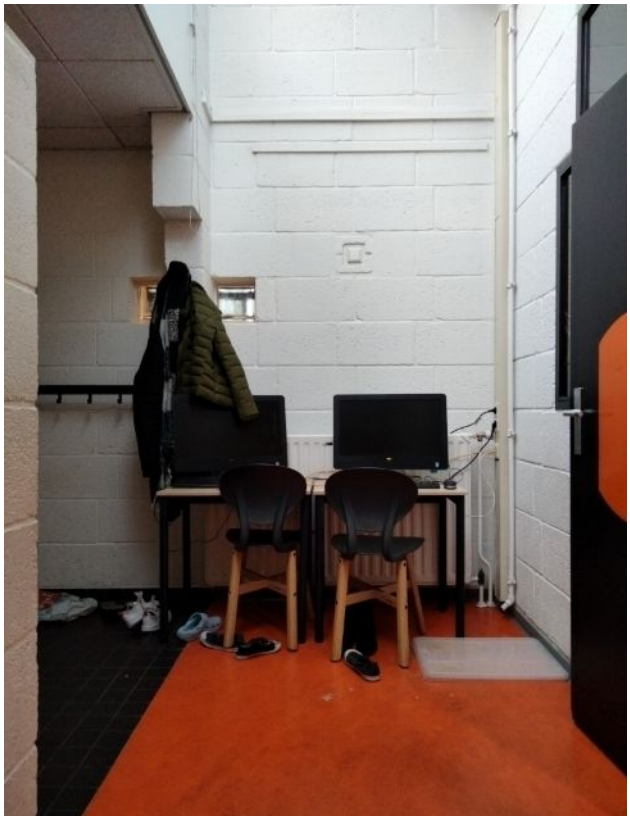


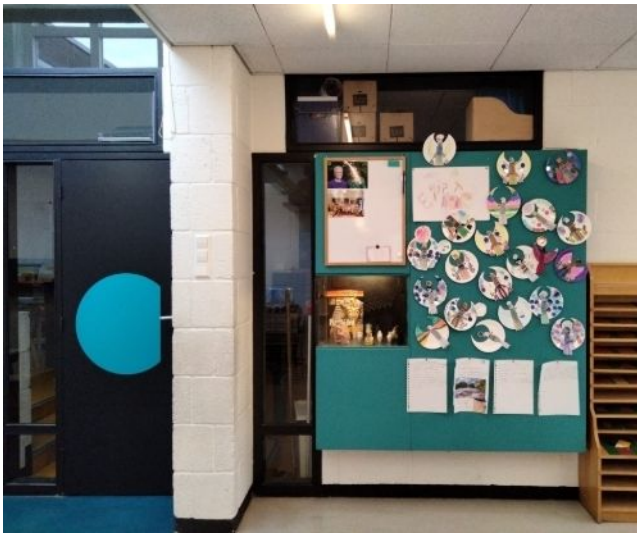
Image 5. Floor plan of the Delft montessori school (Lüchinger, 1987).

The school is organised around a hall, the public domain, the “street”, with the classrooms constituting autonomous units (Hertzberger, 1969; 2008; 2016) that articulate both the interior and the exterior space (Hertzberger, 1969; 2009). The classrooms are themselves also articulated, L-shaped and organised in three different levels through steps; the lower one is destined for more noisy activities, like painting or modelling, the intermediate one is where the classroom meets the hall and the third one is suitable for activities with higher and various levels of concentration (Hertzberger, 1969; 2008; 2016). There is also the possibility for a limited number of children to work just outside the classroom, if they want to.[13] Since the teacher in a Montessori school does not stay in a particular place in the classroom but constantly moves around, it is easy to oversee all students (probably not so easy the ones sitting outside, but I assume that this could be desired at times). With this layout, a transition is achieved between the more intimate, quiet and introvert spaces of the classroom to the more extrovert and public. The small space outside each classroom is designed as cloakroom, so that the common space is not occupied with coats etc. and is able to function as a ‘learning street’. This space which is marked with natural light that enters from above, the facade of each classroom facing the hall which incorporates display cases where students can

13 I was informed about this from a teacher I spoke to during my visit in the school.

place things they make, are all elements that define the classrooms, make them familiar to children and help them to orient themselves in the public domain, clarifying and articulating the space.

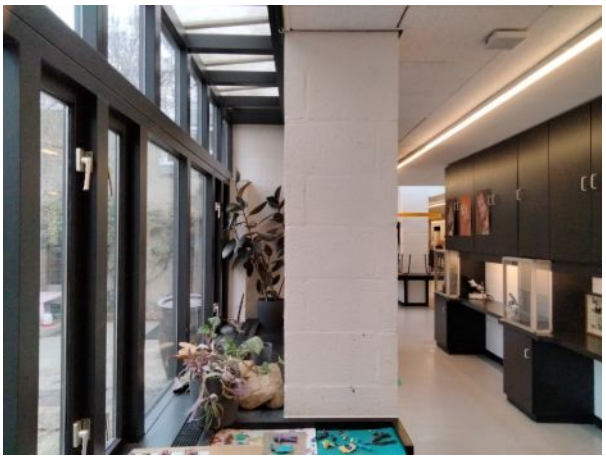




Images 5-7. The space outside the primary classrooms are marked by the light and display children’s creations.

A very important design element that strengthens the city-like organisation is the purposeful use of daylight in combination with height differences. Various learning environments are created; from spaces with low ceiling and not intense lighting to high-ceiling spaces with plenty of natural light from above. Corner windows in the intersection of walls and ceilings are typical of this building. In

this way, apart from the lighting,[14] a connection to the outside is achieved through the expansion of vision (Hertzberger, 2016).



Images 8-9. Corner windows expand the view.

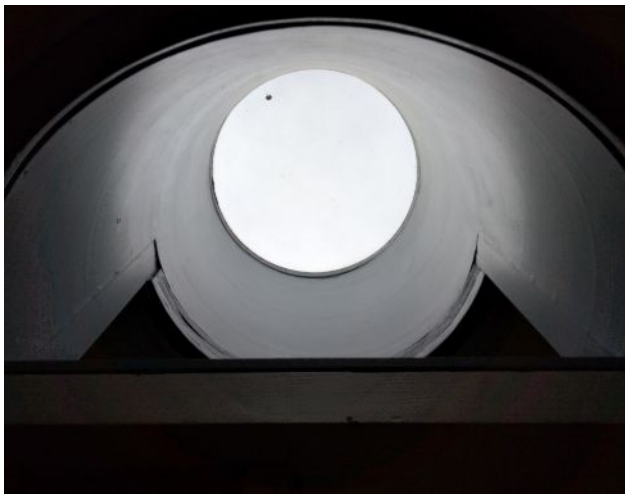
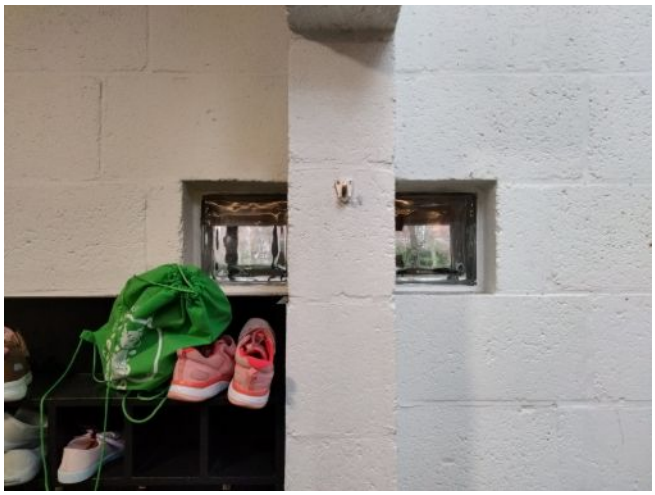
Image 10. A more public space is defined by plenty of light and high ceiling height, in the kindergarten section.

14 This aspect brings forward a critical point, since the amount of light and heat that enters the building might be excessive, resulting in the over-heating of interior spaces.

What is remarkable about the building is the high level of articulation in the common space and the space capacity, which both lead to a domesticated environment. For instance, in the common hall there are a podium – Hertzberger refers to it as “the central point of the hall” (Hertzberger, 2008; 2016) – and a square depression with movable seats, a “block and a hollow” (Hertzberger, 2008). Both of them invite children to interact with them and allow for multiple interpretations. In fact, Hertzberger points out that the very existence of the block is what makes it so strong, because it “evokes a response for every occasion” (Hertzberger, 1969).


Images 11-12. The “hollow” in the kindergarten section.

Apart from the above major design elements, there is also a multiplicity of smaller scale spatial attributes that result in a rich environment; shelves above interior doors and windows where a variety of things can be placed, tiny openings on the walls that frame interior or exterior scenes, skylights that mark the entrance of several rooms, the consideration for sight connections, a variety of natural lighting conditions, to mention a few.

Images 13-14. Skylight above door (left) and tiny openings in a classroom wall (right).


Images 15-16. A tiny opening in a classroom of the kindergarten section: you need to come very close until you are able to see what is happening inside.

Regarding the outdoor space, as already mentioned, this is articulated by the spatial layout of the classrooms in relation to the communal space. In addition, the main entrance of the building is designed as a transition from the school to the playground, the “in-between area where one feels not yet within but yet not entirely outside the school” (Hertzberger, 1969). It is a space where meetings and appointments can be held, where children say goodbye to their parents (Hertzberger, 1969; 2016); it incorporates low walls where people can sit on and walls where you can lean on. If the entrance is the transitional space between the school and the playground, the playground is the transition between the school territory and the neighbourhood, since the absence of a strict boundary that has given its place to a linear low wall across the school’s area result in the playground being part of the street. Hertzberger had originally designed oblong configurations out of low walls made of perforated building blocks at the back of the building that could be used for various activities (e.g. gardens, sand-pits) (Hertzberger, 2008; 2016). However, they were demolished after approximately thirty years of usage without his consent and replaced by paving tiles (Hertzberger, 2008). These were combined with a linear waterway which is present until today.

2.1.2. Apollo Schools (Willemsparkschool and Montessori School), Amsterdam, NL, 1980-1983

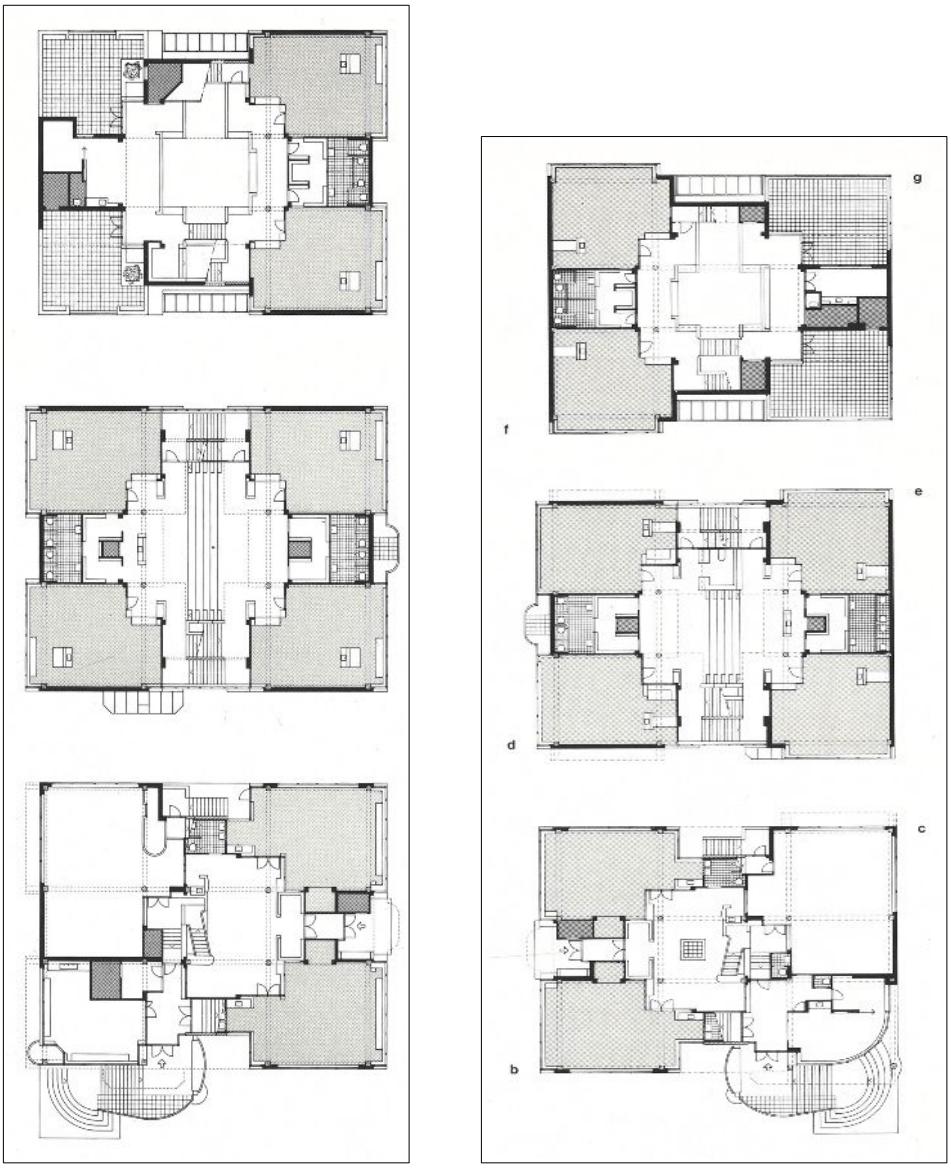
These are two primary schools situated on the same plot and since the 16th of June, 2020, are both listed among the municipal monuments.[15] They have many similarities in their design but also quite a few differences due to their individual location on the site and the divergent principles of the two

15 See more at the website of the Montessori school, at: https://de-ams.nl/erfgoed-van-de-week-over-de-apolloscholen/.

schools' educational approaches (Hertzberger, 2016). The fact that they would be built at the same time in the same place made it reasonable that their design principles would be the same (Hertzberger, 2009). They both are villa-style in order to be integrated in the site, since the buildings in the area were detached houses (Hertzberger, 2009; Lüchinger, 1987). They spread over three floors; the ground floor is destined for the youngest children who attend a kindergarten and the upper two floors accommodate the classrooms of the primary school. Teachers have their own space both on the first floor next to the entrance as well as on the second floor.[16]

Image 17. View of the Willemsparkschool.

16 This is the case for the Willemsparkschool that I visited.



Images 18-19. Floor plans of the two schools (left: Montessori, right: Willemsparkschool) (Lüchinger, 1987).

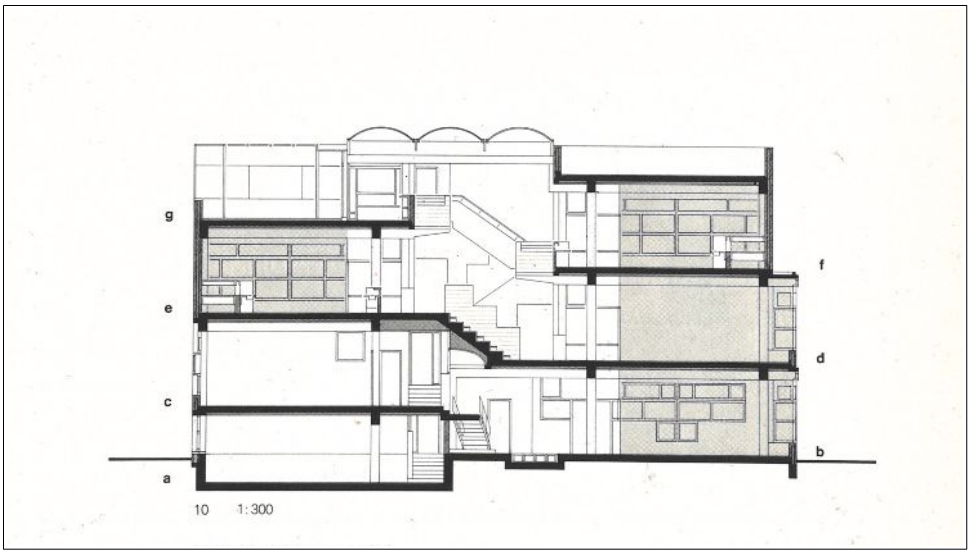


Image 20. Section of the Willemsparkschool (Lüchinger, 1987).

The Apollo schools adopt in the first and second floor a split-level organisation around a central space which incorporates amphitheater steps (Hertzberger, 2009; 2016). This principle which was implemented in these two buildings for the first time (Hertzberger, 2009) proved very successful (Hertzberger, 2009; 2016) and constitutes the characteristic element of the two schools. On top of that, Hertzberger used this attribute in a large number of the schools he has designed since then. This school has also undergone some changes over time, the biggest of which is the closing of three out of the four initially designed terraces (Hertzberger, 2009).

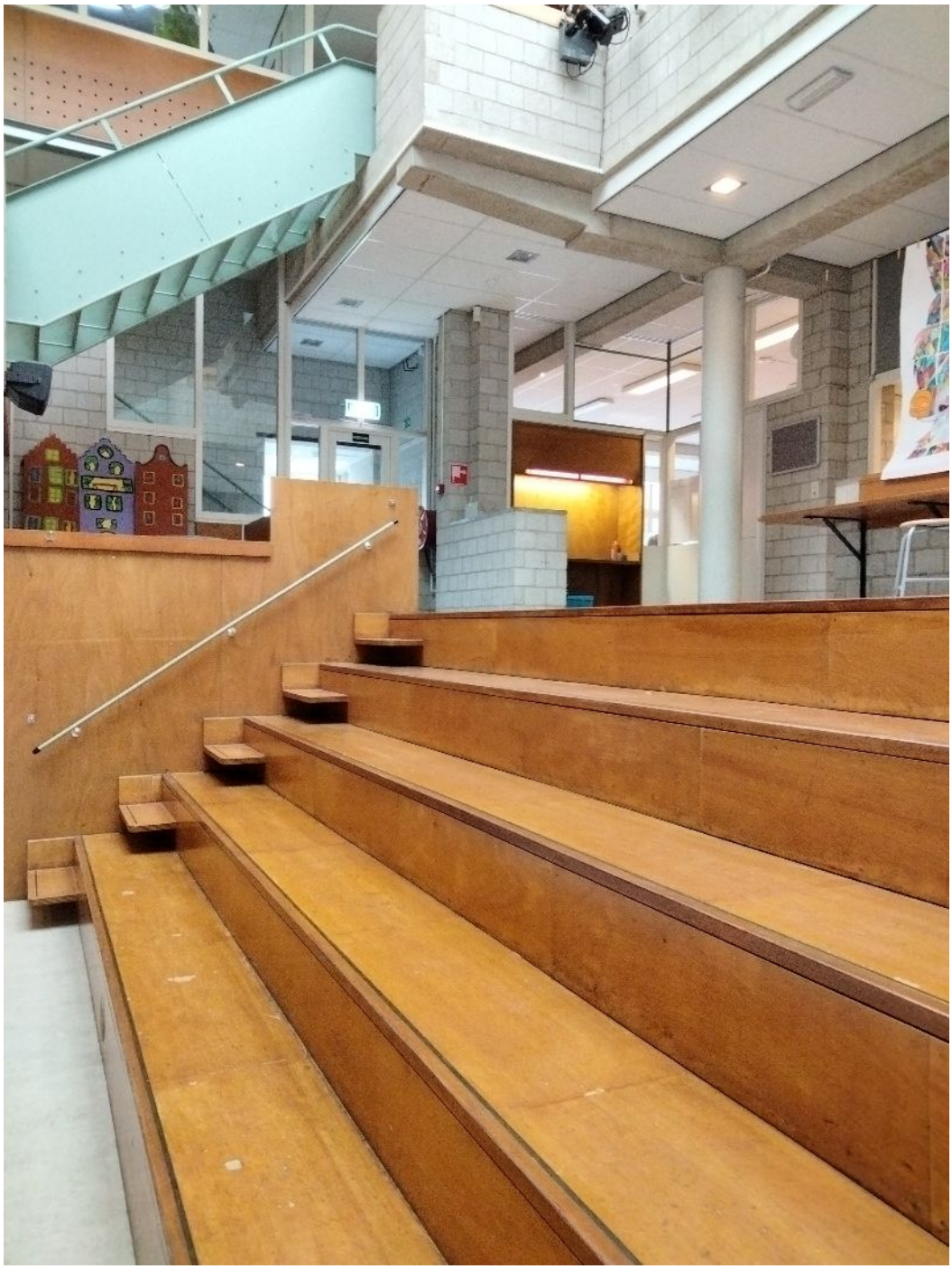


Image 21. View of the common hall. The materials contribute in an inviting environment.

But what is so special about this interior organisation? It creates multiple sight lines between the several levels that are created (Hertzberger, 2009; 2016), increasing the chances of contacts among children and enhancing socialising. Also, it itself constitutes the communal space of the school where the classrooms meet and gatherings and events can be held (Hertzberger, 2000). Actually, the capacity of the space is enough to accommodate the whole school (Lüchinger, 1987). Here, children can sit, play and work in groups and individually, very often using the big stairs as tables (Hertzberger, 2000; 2015 interview). The entire space, with its compact and clear design, being so open and well illuminated by the skylights of the roof as well as other light sources, results in a very welcoming environment. This central hall really gives the feeling of the ‘heart’ or the “living room” (Hertzberger, 2016) of the building.

The classrooms are once again articulated, with an L – or almost L – shape, while those of the primary school are equipped with kitchen units with adjoining worktables (Lüchinger, 1987). Just outside the classrooms, in the ‘in-between’ space, there are configurations that mark each classroom’s location and can be used by individuals or small groups; these include a worktable with a bench or a cupboard behind a low wall, shelves and, in the case of the Montessori school, a display case attached to the facade. Via the proper amount of openness that is achieved with the use of half-doors (Hertzberger, 2008; 2016) in the classroom’s facade, the teacher is able to see what is happening out there. This spatial design results in a transition from the more private domain of the classroom to the public central hall through the in-between space which provides an intimate environment; a child there can be secluded from their peers in the hall and the classroom, while having at the same time the feeling of safety because he or she is right next to their homebase, that is the classroom.

Image 22. View of the central hall. Two “in-between” spaces are created in different levels.

As far as the outdoor space in concerned, Hertzberger had originally articulated the entire space using low walls that defined individual zones which could accommodate outdoor classes (Hertzberger, 2008). He had also designed the two outdoor spaces of the kindergartens with configurations out of low walls, similarly to those of the Montessori school at Delft. The two interior kindergartens have a direct access to this space (Lüchinger, 1987; Hertzberger, 2008). However, today only the part corresponding to the Montessori school is preserved, with the structure having being transformed into little gardens, as well as parts of the low brick walls in the rest of the yard.

What is characteristic of the exterior of the two buildings and shows clearly Herman Hertzberger’s perception on architecture is the big stairs that lead to the first floor. Here, instead of designing just a stair, Hertzberger created simultaneously a space underneath, which is next to the kindergarten’s entrance, that can be very well used and inhabited by children (Hertzberger, 2000; 2016). Moreover, as Hertzberger says (Hertzberger, 2016), “every kind of step or ledge by a school entrance becomes a place to sit for the children”.

2.1.3. Polygoon (Primary School with gym), Almere, NL, 1990-1992

This school building consists of two parts which are connected on the ground floor but distinguishable on the first floor; the two-storey rectangular block that hosts the gym, a playroom, the teachers' place and some auxiliary facilities and the other part, the main one, the "elongated streetlike space" (Hertzberger, 1995; 2000) with a curved roof over its central space that accommodates the sixteen classrooms.

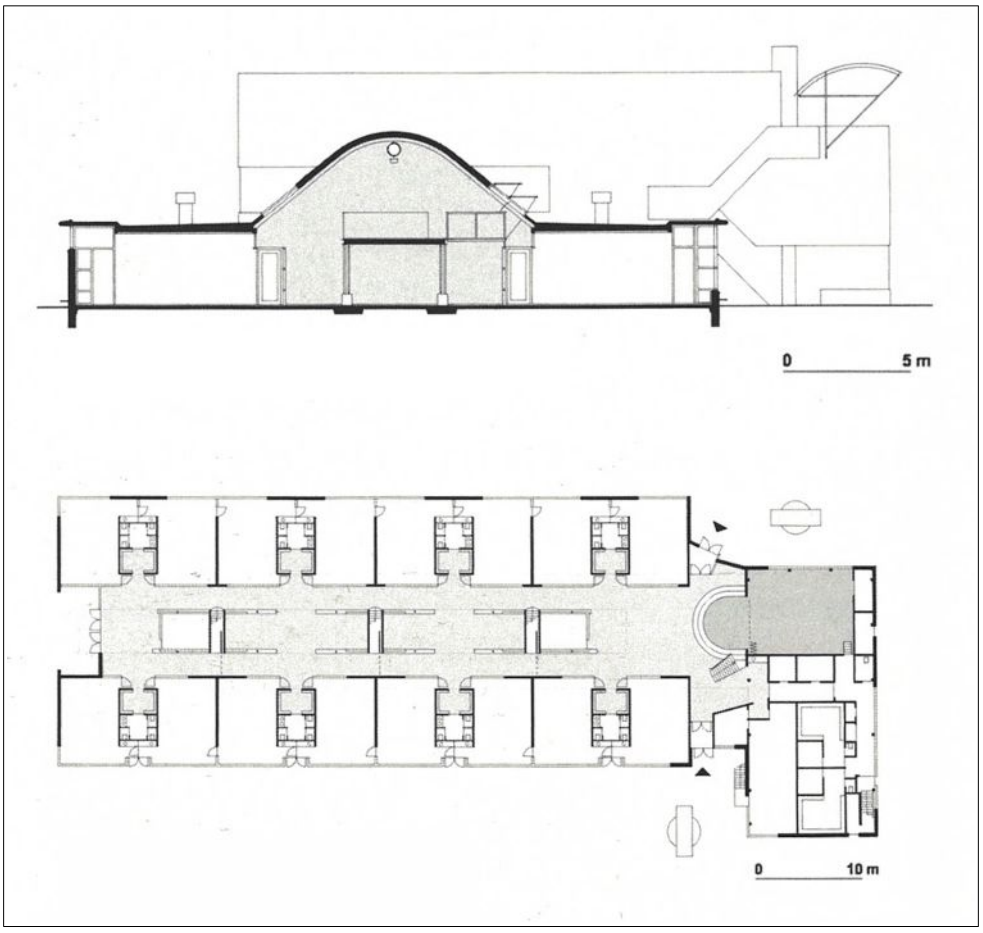


Image 23. Ground floor plan and cross section (Hertzberger, 2009).

The design of this space, while it adopts the well-known principle of the 'learning street' (Hertzberger, 1995; 2000; 2009), it introduces another spatial theme, that of a "shopping street" (Hertzberger, 2009), arising from the "bay window-like zones" (Hertzberger, 2000) that all the classrooms have and their relation to the 'public' domain of the building. The classrooms, eight in each side, are organised in groups of two, with their entrances facing one another, having the same colour[17] and sharing the lavatories and the cloakroom - thus leaving the zone outside free for activities. The central space between those two sides offers a variety of other smaller spaces with a

17 It should be noted here that this does not seem to always have been the case. In coloured photos published in the book "The schools of Herman Hertzberger" (2009), all the classrooms are white and the interior floor is blue. Today the colours are differentiated.

certain degree of openness controlled by sliding panels in a spatial layout that resembles a ‘train’ (Hertzberger, 2009). In this way, “open plaza-like” (Hertzberger, 2000) spaces are created to serve as collective spaces among classrooms. Additional spaces are created on their roof’s level which is accessible by three staircases. It is worth mentioning that the above spaces were destined to host several activities happening next to those taking place in the classrooms but also provide the room for “extra workplaces without prescribed functions and suited to the variety of educational situations that can arise in a modern school” (Hertzberger, 2000). The adaptability of these spaces is indeed clearly perceived at once; each of them can be configured according to the needs of the given school. The two ‘lanes’ of the learning street outside the classrooms together with “the string of islands” (Hertzberger, 2000) in the middle are all covered by the curved roof, side openings on which allows plenty of natural light to enter the building. The result is a well illuminated and colourful interior with a multiplicity of spaces that can accommodate individual and small groups activities and a variety of visual sight lines, both in the interior but also to the exterior space; while walking along the space, one can have several views: towards the classrooms of both sides (the opposite ones are filtered by the spaces in the middle), towards the centrally located spaces themselves, each of which reveals a different world, towards the inner roof and also towards the outdoor space, again through the windows – interior and exterior – of the classrooms. At the same time, when in the classroom, children can have an unobstructed view of what is happening outside of it. In fact, this is something purposefully done, as we can see in a sketch made by Hertzberger. Nevertheless, the great height of the space, reaching roughly 6,5 meters, probably arises a critical question as to whether the upper level can be functional since it can get cold in winter and hot in summer.

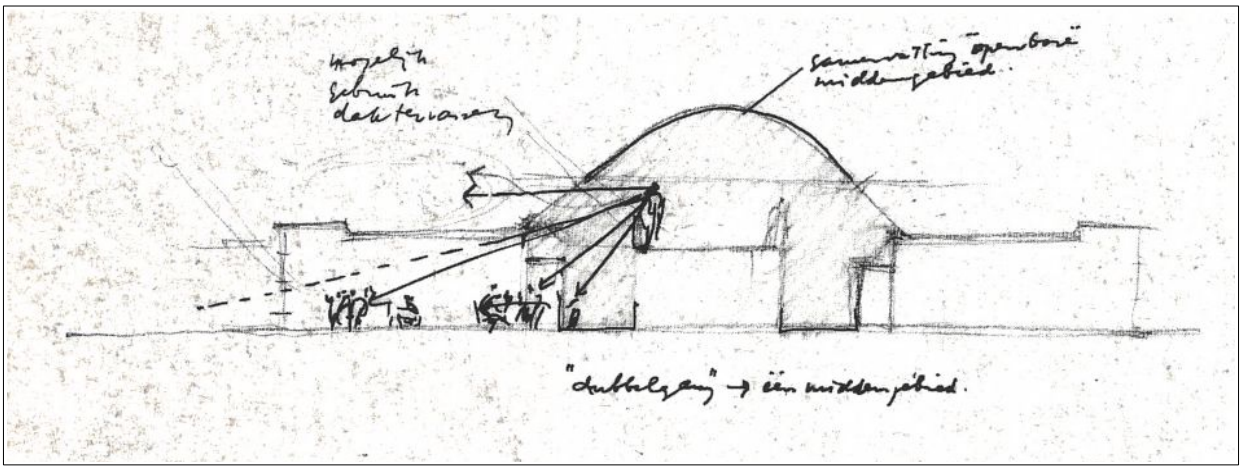
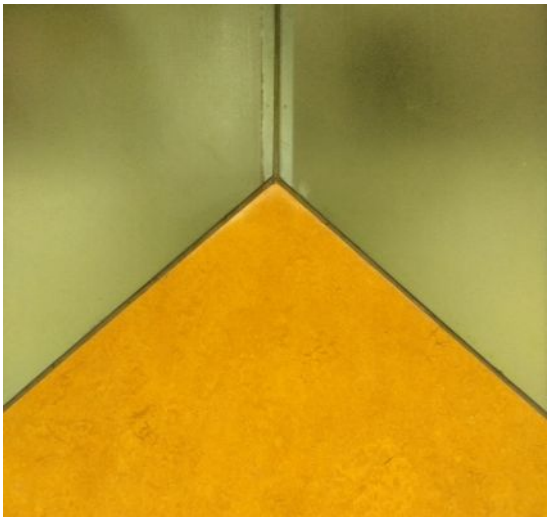


Image 24. Sketch of Hertzberger showing the variety of sight lines (Hertzberger and Kirkpatrick, 1995).

Image 25. The “learning street”.



Images 26-27. View from the learning street. The bridges' floors have two materials; one of which has a degree of transparency, so that it does not block the light.

Images 28-29. View from the central zone. The interior is fully domesticated.

Apart from the collective spaces created across the middle area, there is a large open one, which has a full height and contains a semicircular recessed space. The latter can be expanded with the use of folding partitions, occupying the playroom behind it. This central hall can accommodate large gatherings but also offer places for individual or small groups work, far from the classrooms.

Image 30. View of the common hall from the upper level.

As already mentioned, the classrooms are organised in pairs. There is a local recession in the classrooms' facades, creating the entrance space which includes the two facing door and leads to the shared cloakroom and lavatories. With this design, the entrance space is marked and likely to become a familiar domain for the students. All classrooms contain a kitchen unit in the back side and are connected with back doors or sliding partitions that allow for two adjacent classrooms to become a large one (Hertzberger, 2000). The eight classrooms located in the southwest side of the building are also directly connected to the outdoor space with additional doors. It seems that the building was designed to accommodate primary as well as a secondary school in the future, with the feature mentioned being destined for primary school classrooms.[18]

The access to the outdoor space is very well achieved; half of the classrooms have a direct access, as mentioned above, and there are three entrances in the building which are located so as to cover three of its sides. In addition, the block containing the gym has an individual access to the fourth side. The schoolyard contains a few low brick constructions, an amphitheater-like construction in

18 There is a diagrammatic floor plan in the book "Space and the architect" where this distinction is mentioned. It is also noted that there are different entrances in the building for primary and secondary schools.

the northeast side, cast concrete sand pits[19] and two free-standing structures, not maintained in good condition today, that Hertzberger calls ‘shelters’ (Hertzberger, 1995; 2000; 2008) located near two of the entrances.

2.1.4. De Spil (Extended School), Arnhem, NL, 2004-2007

This building accommodates two primary schools, a kindergarten and childcare facilities, a gym and some facilities for the local community (e.g. a room for adults’ activities and rooms available for rent) (Hertzberger, 2009; McCarter, 2015). As a result, it is a much larger and more complex building than the previous ones that calls for different needs and design solutions. The building consists of two blocks, which are perceived as a single one, that are separated by a ‘light-street’ (Hertzberger, 2009); an elongated block that hosts the two schools and the pre-school, facing a city park, and another one that hosts the public facilities and faces the neighbourhood. The kindergarten is located on the ground floor and the primary schools spread over two floors each and are accessed from the first floor.

19 These can be found in different locations than they were originally designed, but in this case they seem to have been successful, unlike in the two previous schools.

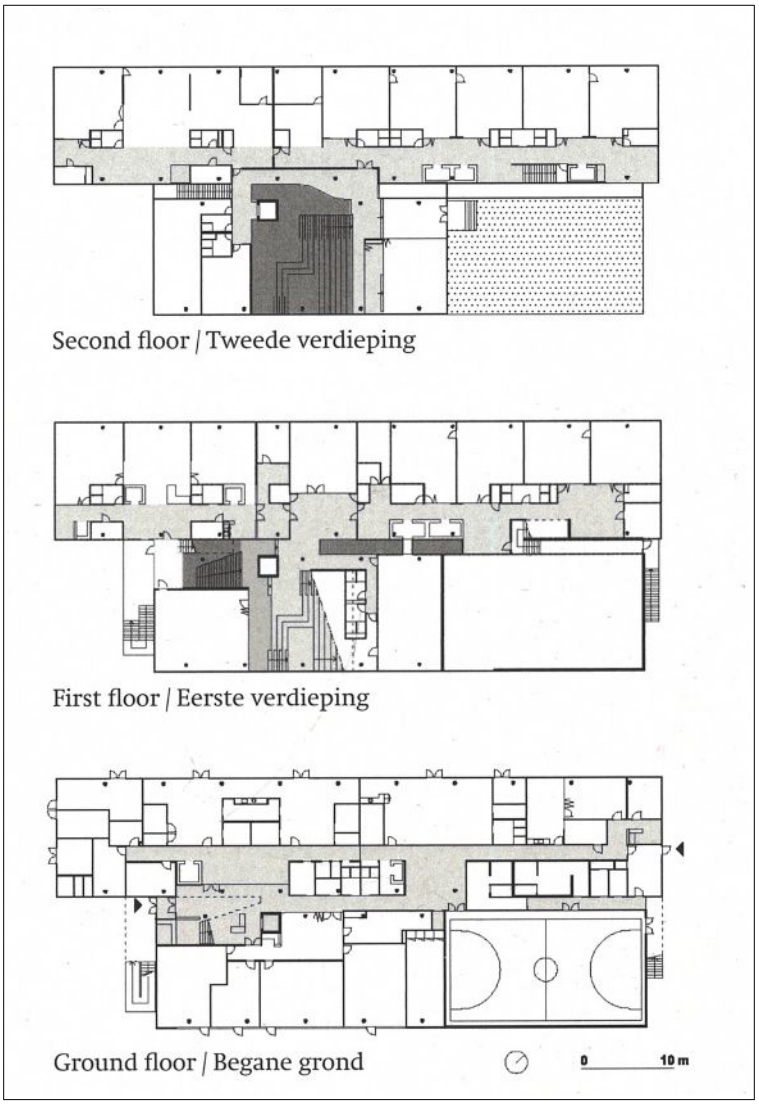
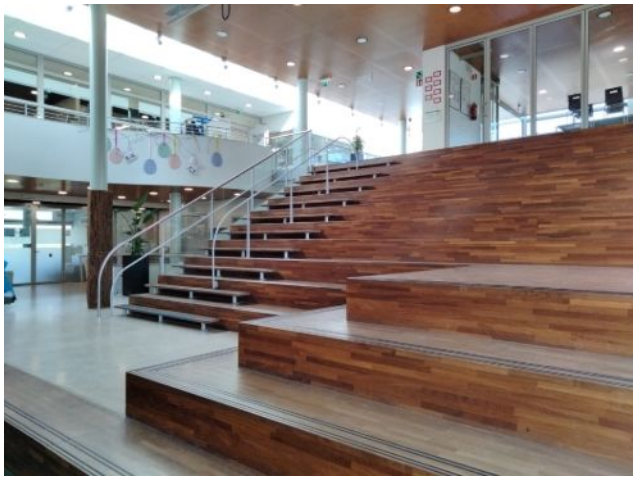


Image 31. Floor plans of the school (Hertzberger, 2009).

It might be probably because of this interior spatial organisation that, upon entering the building, the space is not very welcoming but rather gives the feeling of an entry area from which you can access certain facilities (e.g. the kindergarten on the left part, the public rooms on the right or taking the stairs to the upper floor where the primary schools are located) without getting a clear understanding of the whole building's structure.[20] However, when reaching the first floor the space opens up by a large, double heighted and bright amphitheater; this can be expanded occupying the spaces at the two ends which are separated by folding partitions. This space can be used for large gatherings, theater plays, classes, but also for smaller group activities or by parents waiting for their children to finish their class. Were it more integrated into the rest of the schools' facilities, for instance the classrooms, it would probably be more part of a learning landscape. Nevertheless, something like this may not have been feasible due to the diverse program of the building. In its

20 In the description of the building in the book "The schools of Herman Hertzberger" (2009) it is stated that: "… the public character of this space calls for more generous accessibility with a more spacious hall and a more inviting entrance".

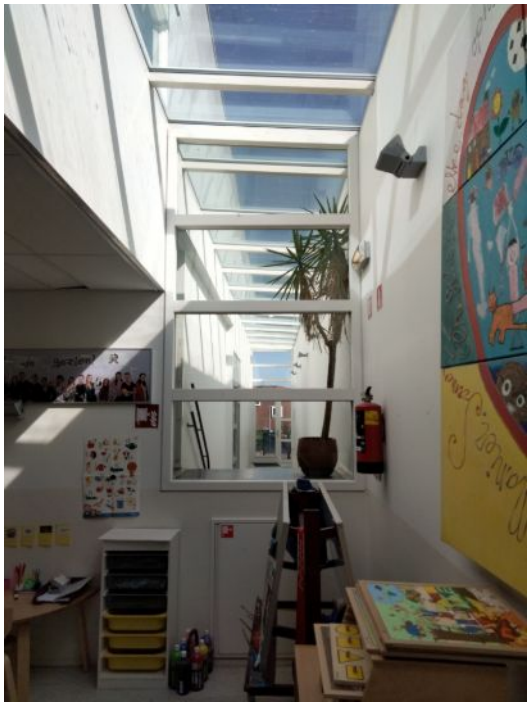
current location this space is not only where the two elementary schools meet, but actually all of the building's facilities. It should be also mentioned that the design of the first and second level allows for a multiplicity of – at times - unexpected visual sight lines and a variety of lighting conditions.




Images 32-33. Views of the common hall.

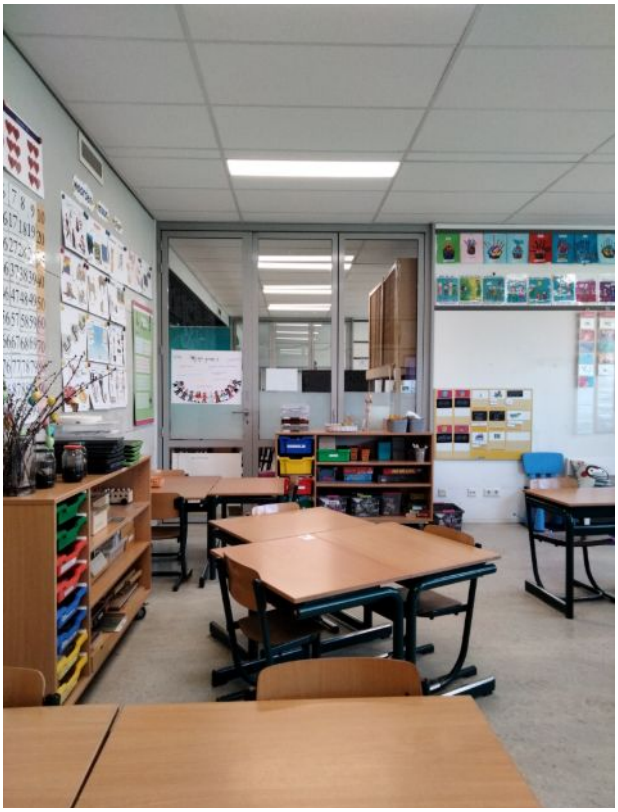
Image 34. The "light-street" provides light and a multiplicity of visual connections.

If the above spaces constitute the public domain of the building, each school's section could be resembled to a 'home', a more familiar environment; you can tell this by the amount of students' belongings in this space comparing to the other. Looking at the floor plans of the building, Hertzberger attempted to design the schools with minimal full-height partitions among the classrooms and the corridors, articulating the space openly with a variety of fixed rooms, walls and other lower structures such as cloakrooms. However, this is not the state of the schools today. More specifically, in the primary school occupying the southwest side there are folding glass partitions between every classroom and the corridor that do not appear in the plans, while other structures that would articulate the space were missing except for fixed rooms and lavatories.[21] Just a few years ago, these partitions were missing but other than that the situation was the same.[22] It might be because of this reason that clothes are hanging in movable railings outside the classrooms, while in the other school they are placed in appropriately designed structures. The classrooms themselves are connected with back doors as well as with folding glass partitions but they are not articulated. Regarding those of the kindergarten, they contain kitchen units and have direct access to the outdoor space.[23] Even if the above mentioned changes have been made to the initial design, it is owing to the folding partitions that classrooms and corridor can become a unified space.



Images 35-36. Space outside the classrooms in one of the primary schools: the light is inviting.

21 It is a question whether they were initially built or not.
22 I noticed this while searching for old photos in the facebook page of the school.
23 The kindergarten seems to adopts an openly articulated plan with no certain boundaries for each classroom. During my visit I did not have the chance to enter this section, so it is unknown if this is the state today.

Images 37-38. Left: a playful structure under the staircase of one of the primary schools. Right: foldable glass partitions between classrooms of the other primary school.

The building stands in the site as a concrete block, surrounded by open space which is entirely open to the public. Part of it is designed as the school's yard and the rest is a park designed eventually after 2009.[24] In a sense, the building with its surroundings function as the gateway to the park, due to the undisturbed movement from the nearby neighbourhood to the park which passes through the schoolyard. (photo of curtains and diagram). In the schoolyard itself the design includes a long semi-circular amphitheater where outdoor classes and other group or individual activities can take place, a few permanent small-sized low concrete blocks and again some sand pits combined with a larger play area filled with sand. In addition, part of the schoolyard which is accessed from the kindergarten section is designed individually.

24 In the book "Schools of HH" which was published in 2009 we read that a city park would surround the building.

Image 39. The schoolyard as a gateway to the city park.

2.2. Comparison

After having analysed each of the above four schools, we can now get a clear image of some of the various ways that Herman Hertzberger has implemented his principles regarding the architecture of schools throughout the years. Despite the few differences that one can spot, the similarities are by far more.

The principle of ‘the school as a city’, i.e. the public character of the school that enhances socialising, is present in all four designs only manifested in differentiated ways. It can be either a public street in the cases of the Montessori school in Delft and the Polygoon, irregular or linear respectively, or a public hall around which the classrooms are organised such as in the Apollo schools. In de Spil, a common hall is also present but it does not constitute the core element of the schools’ organisation, rather a place where the three of them meet; It should be noted that the common hall is indeed a spatial theme adopted even when it is not the main design principle, like in the Polygoon or de Spil, adjusted in size to meet the school’s needs and flexibly designed so as to be enlarged and satisfy various space capacities and activities.

There are two elements that contribute significantly to the accentuation of the public realm of the schools and enhance socialising: the natural lighting and the visual connections. Regarding the light, apart from being more than sufficient and resulting in well illuminated and pleasant spaces, it is treated as a space-generating element. The several angles through which light enters the buildings combined with the appropriate ceiling height in every case, shape a variety of spaces that are clearly defined, recognisable and inviting. In this way, the third dimension of the space is emphasised; the eyes are triggered to look not only around but also upwards. As such, when light meets the more public domain of the school, the outcome are spaces that call for interaction and communication among children, for collective activities. According to each school’s organisation and typology, we can identify several patterns for lighting; in the case of the Delft montessori school the light enters the building locally from above combined with height differences, in the Apollo schools the entire common hall is full of light due to the large skylight, in the Polygoon oblong skylights across the roof light up the ‘learning street’ and in de Spil the treatment of light has been turned into the main spatial theme.

In each of the four schools there is a high consideration of visual connections, once again corresponding to the individual spatial layout, and achieved through a variety and large amount of

openings. For instance, in Delft montessori school, owing to its being developed in one level, sight lines are created by various sized openings on the walls and small height differences in the classrooms, while in the rest of the schools that spread over one or two floors other spatial means have been implemented such as voids, bridges and multiple levels. In de Spil this multiplicity of sight lines is combined to a more complex layout, comparing to the previous schools. Except for the above, when discussing the visual connections, the relation to the outdoor space should not be disregarded. The latter is realised by large openings in the facades which at times are combined with inner transparent layers (e.g. the Polygoon). One is able to not only see parts of the schoolyard and the surroundings but also look upwards again, at the sky (corner windows in Delft montessori, linear skylight in de Spil). This variety enhances the public character of the school which is not secluded from its context.

The articulation of space is achieved in a range of ways in the four schools. Regarding the classrooms, the highest degree of articulation can be found in the Delft montessori school; both the L-shaped layout and the implementation of height differences in the floor and the ceiling create several environments in the same room. In the Apollo schools the classrooms are again L-shaped but developed in one level. In both cases there are additional elements that articulate the space, such as free-standing kitchen units or low-height walls. In the next two schools the classrooms, although not so much articulated, adopt another principle; they are connected with back doors (Polygoon) and folding glass partitions (de Spil). The rest of the space in the schools is articulated either by its own shape (for instance, the ‘learning street’ in the Delft montessori or the central zone in the Polygoon) or by means such as low walls, free-standing furniture and units, floor recessions; in fact, in the montessori in Delft and in one of the Apollo schools (the Willemsparkschool) there is the same built-in the floor structure for the youngest children. We could say, comparing the four schools, that the last one incorporates the smallest amount of articulation elements, at least in its present form.

The space between the classrooms and the corridor or the common hall is designed in a variety of ways but in any case it is marked and clearly recognisable; this is achieved either spatially by creating a transitional space defined by middle-height walls (in Delft montessori) or low walls combined with built-in furniture in the case of the Apollo schools and by facade recessions and colour differences in the case of the Polygoon and de Spil. It is worth mentioning that, although at first sight they might seem quite similar, the space created in Apollo schools can be entirely used for activities, while the largest part of the one in Delft montessori school is merely for placing personal

belongings. In de Spil the intention was that classrooms would be organised in a more open way which would result in a smooth transition from the more public domain to the ‘classroom’. Even though this is not the case today, the classrooms can entirely open up to the corridor owing to the foldable facades.

Apart from the above, there are two characteristic and repeated spatial themes in these four schools. The first is the design of two cloakrooms in combination with one lavatory that are shared by pairs of classrooms; the only case where this is absent is in the oldest part of the montessori school in Delft where each classroom has its own cloakroom and the lavatories are common for all. The second one is the kitchen units that almost all classrooms contain. However, the way that the kitchen units are incorporated in the design differs. In general terms, we can say that these constitute central design elements that articulate the space around them in the montessori in Delft and the Apollo schools, while in the Polygoon they are placed in a less highlighted space, next to the back doors between two classrooms. In de Spil, unlike the kindergarten section, the primary school classrooms do not have their own kitchen unit; these can be found in shared areas.

Conclusion

The architecture of school buildings, inexorably related to pedagogical and educational approaches, is of high significance; it should be able to provide rich and stimulating learning environments where children feel safe but at the same time challenged to discover the world around them. Herman Hertzberger, having a large experience on the field, has developed a corresponding theoretical framework where he elaborates on the several principles that should be taken into consideration during the design so as to achieve the above qualities. As analysed in detail in the main body of the paper, the core of what he suggests is that the entire school should be functioning as a ‘learning landscape’, providing a multiplicity of spaces where children can do individual, small and large group activities and enhancing socialising. It is interesting but rather comprehensible, considering his longstanding experience, that what he supports is in agreement with what the broader literature advocates.

Even though Hertzberger suggests some specific principles, such as the articulation of space, the transformation of corridors into ‘learning streets’ or the design of school buildings as cities, there is certainly not a prescribed spatial theme to express all of them; in addition, the correlation between the theory and the practice is itself interesting to explore. In this sense, the analysis of the four selected schools regarding the spatial manifestation of these principles was truly an interesting and challenging process. For, what this analysis and personal experience in the schools have revealed to me is the richness of their design. Despite some critical points that were identified, it is remarkable to see how all the things Hertzberger has written about have been realised in the real world with a high degree of success; the multiplicity of learning environments, the creation of inviting spaces that call for exploration, the combination of the public character of the school, the one that enhances socialising, with the more secluded and intimate spaces that are always necessary for children, and above all, the ability the users, the children, to domesticate the space.

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