THE SCHOOL'S BEATING HEART

Three elementary schools by leading architects around the year 1980

Abstract

Life is an ever-evolving process, over time new ideas are born and offer new possibilities and approaches to handle familiar problems or processes differently. This is also the case for educational buildings and the architectural ideas that they represent, especially in the social and interactive realm.

The school's beating heart focuses on the central hearts of three elementary school buildings, built around the year 1980, designed by Jan Verhoeven, Herman Hertzberger, and the Architects firm Van den Broek & Bakema. This thesis in particular addresses the way these central hearts evoke social interaction through their architecture and unravels the ideas of the architects on social interaction in the bigger context of educational and architectural thinking during the time the projects were designed. This resulted in the research question that takes a central place in this thesis: *What are the ideas of the architects of 't Ronde, Apolloschools and De Schalm on meeting in the schools and how do the school buildings evoke social interaction?*

This thesis is structured by exploring the greater context of Dutch education and Western thoughts on the structuralist architectural movement and formulating their main points of focus and concepts. These points are used to analyze the three elementary school buildings in an individual way, which allows the buildings to be compared in an equal way. The thesis concluded by stating that all schools have similar concepts and ideas behind their designs, but that the outcome of the school buildings is largely affected by the organizations that initiated the design and their philosophy on education.

Keywords

Jan Verhoeven, Van de broek en Bakema, Herman Hertzberger, Collective, Central heart

Jasper Sterrenburg - 5653673

The school's beating heart

Author

Jasper Sterrenburg

5653673

Tutor

Dr. Dolf Broekhuizen

Course

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1. Introduction

Social interaction in education is a great measure for improving the quality of education '*Active engagement helps create a positive classroom environment and establish a community of learners who support each other.*' (Hurst et al., 2013) In this thesis, social interaction is seen as a verbal or non-verbal interaction between two students, a group of students, or the entirety of all the tutors and students using the school building. Social interaction is evoked in the elementary schools that are the subject of this history thesis. During this research the three schools built around the year 1980 will be analyzed, focusing on how the central hearts of these buildings evoke social interaction amongst the students. The three elementary schools that have been selected all vary in their approaches to design for this central heart, and are all designed by different architects, naming:

- Montessorischool 't Ronde, Leusden (1979) – Jan Verhoeven
- Apolloschools, Amsterdam (1980) – Herman Hertzberger
- Public elementaryschool De Schalm (1982) – Van de Broek en Bakema

Meeting and social interaction take place on multiple levels and in many varying situations in and around the hearts of the school buildings. A student can for instance meet with just one other student, the class, or the entirety of all the students and tutors in the school, all requiring different approaches to the design of the space. This research will therefore investigate the ideas of the architect on meeting and evoking social interaction in the spaces, resulting in the following research question: *What are the ideas of the architects of 't Ronde, Apolloschools, and De Schalm on meeting in the schools and how do the school buildings evoke social interaction?* In previous research, all school buildings subject to this thesis have already been investigated. It is, therefore, the goal of this thesis to expand upon this base of knowledge and compare the three school buildings, which is not yet researched. It is aimed to use findings to gain insight into methods that can be inspiring to use for the design of school buildings for future projects.

Educational Context

Around and after the second world war the current way of education in the Netherlands was criticized for its classroom-based learning. This critique eventually resulted in new forms of education, also influencing the way elementary school buildings were organized. (Boersma et al., 1996, p. 8) The system of education gradually changed from just transferring knowledge to the personal and general development of the students. (Steijns & Koutmanis, 2004, P. 26) This attention to social interaction during the 70s resulted in school buildings, like 't Ronde, designed as a village in which the classes are families. (Broekhuizen & Arkesteijn, 2015, p. 306) Besides this educational context, the three architects could be seen as part of the structuralist movement in the Netherlands. This movement can be described as '*designs and buildings that exist of repetitive elements, which in theory can be adjusted in size and function of use. Besides this, structuralist buildings take social relationships as a concept making them able to stimulate social interaction amongst users of the building.*' (Smit, 2018, p. 81) therefore linking this movement to the attention to social interaction that was a common theme during the time.

Architecture and Structuralism

All three architects can be linked to the structuralist movement, this can for instance be read in the book Jan Verhoeven: exponent of structuralism by Zahle '*... This interest has influenced the work of Aldo van Eyck, Verhoeven, and others in architectural and orderings principles that we know as structuralism.*' (2012, p. 24) Also, Jaap Bakema, one of the architects of Van de Broek & Bakema is linked to structuralism, as stated by Van den Heuvel: '*Is Bakema following structuralism here, saying that architecture should be studied like a language..*' (2018, p. 26) Although Herman Hertzberger doesn't mention structuralism in his books, descriptions of his projects still have a close link to structuralist thoughts: '*If areas are linked around a hall, this will create, both there and outside, a whole series of corners and ultimately a highly articulated building mass that will be relatively easy to expand.*' (Hertzberger, 2009, p. 162) A part of the vision of all architects is designing spaces to suit people, quoted by Hertzberger: '*Everything that has been deliberately shaped should function better, i.e. it should be better geared to doing what is expected of it, by different people in different situations and at different times.*' (2016, p. 151) A similar thought is written by Jaap Bakema: '*The living environment of the individual should be given form as if it is part of a community*' (Ibelings, 2000, p. 32) Because the buildings are designed by architects that are inspired by the structuralist movement, the buildings also have visible influences by the principles of structuralism.

A lot of individual research has thus already been done on the individual buildings, what makes this research interesting is the fact that the buildings can be compared to one another, finding out the common and uncommon factors.

Methodology

The method used for this research is based on a literature review and an analysis of archival material, consisting of plans, sections, sketches, etc. In some instances, graphical analysis made by the author will be used to clearly illustrate building features that are described in the text. All literature has to do with or is directly related to the architects, the buildings, or the educational systems of the time the buildings were built. The first step of the research is analyzing the educational and architectural context the buildings are designed in. Then the buildings will be analyzed to find the methods the architects have used to evoke social interactions. following up an evaluation will follow if the architects have succeeded in their concept of the building. Thereafter the analyzed buildings will be compared to one another, followed by an evaluation of the results which tries to discover the common and varying factors.

Structure

The structure of this thesis follows the methodology, starting with the architectural and educational context during the period the buildings were built, followed up by the individual analysis of the buildings themselves. Finally, a comparison will be made consisting of the buildings that were analyzed. In the conclusion, the findings of these comparisons will be shown.

2. Educational and Architectural Context

Life is an ever evolving process, over time new ideas are born and offer new possibilities and approaches to handle familiar problems or processes differently. The same can be said for architecture and education, which are never ending processes of change and improvement. In this chapter a brief history and the context of the educational systems will be given. The brief history will give lead up to the eventual concept of education around the time of the 1980s in which the selected schools were designed. Then the architectural movement of structuralism will be explored, unraveling the ideas and systems the architects were using for their design processes. Finally, architecture and education will be linked, explaining how both are related to each other.

2.1 Educational History and Context

Education in the Netherlands can be globally divided into two periods. The first period of 1800-1940, was characterized by traditional education. And the second period of 1945 till the present time, in which traditional education was criticized and led to new forms of education. (Boersma et al., 1996, p. 8) Even though all buildings are designed in the second period, a brief history of the events that lead up to the change in the second period is useful to understand where the view on education came from.

The Dutch government started implementing rules and laws in the year 1801 focused on primary schools. (Steijns & Koutmanis, 2004, p. 17) This was the start of an important period up until 1830 which was crucial for the development of the Dutch school buildings. The school changed from a building without typical characteristics to a recognizable building with a specific spatial arrangement that was suited to the activities of the school. (Steijns & Koutmanis, 2004, p. 20) This also had to do with the fact that traditional education had to be given, which resulted in classrooms with rows of tables aimed at a specific wall that contained the blackboard. (Boersma et al., 1996, p. 17) This later resulted in the corridor school, which was the prototype of the school till far in the 20th century. The development of new school types was limited due to strict regulations by the government that limited architects and educational institutes. (Steijns & Koutmanis, 2004, p. 21) These strict regulations were also very focused on the hygiene and health of students, which were big factors for the designs of architects. The rooms were more designed based on the modernist thought of 'light, air, and space' than on matching the function of education. (Boersma et al., 1996, p. 19)

From the start of the 20th century education was becoming more important in society, bringing discipline to the students was then seen as one of the primary tasks of education. Besides this bringing people together was another important factor at that time, resulting in the addition of the aula. (Steijns & Koutmanis, 2004, p. 25) After the second world war educational reformers became more influential, which resulted in new buildings and a new architectural language that fits with these new types of education. One example can be the Jenaplan for instance was focused on the thought that the child is the product of relations with other people. Another example is Montessori education, which was focused on self-education and self-development. Both of these forms of education require a large communal space, spaces for smaller groups, and individual workplaces. (Boersma et al., 1996, p. 22-23) From the 1950s onwards, the pedagogic view was that students need more space than just seating space, resulting in an increased demand for multifunctional spaces for group activities. (Steijns & Koutmanis, 2004, p. 27) In 1953 a report de nieuwe school voor het basisonderwijs the school was approached as a complete society, in which the building of character is just as important as learning itself. This eventually led to the hallschool, which eventually ended up as a built organization scheme. (Boersma et al., 1996, p. 194) An example of this type of school is the Montessorischool 't Ronde, in which a class is seen as a family and the school is seen as a village in which each student functions individually and together in case of meeting with other students. (Broekhuizen & Arkesteijn, 2015, p. 306)

Now we have arrived at the time the three schools have been realized, which is around the 1980s, eventually, these types of hallschools got criticized. '*The demand for flexibility was so strong that the educational comfort was sacrificed for it.*' (Boersma et al., 1996, p. 195) Changing needs for education in the 1980s increased pressure on the hallschool and led architects back to linear types of school, with smaller classrooms for more specific types of education. This was a result of the rise of special needs education and the increase of immigrant students. (Boersma et al., 1996, p. 200) It is therefore important to keep in mind that although the hallschools researched in this thesis have good ideas for social interaction, these ideas may also have undesirable effects on education.

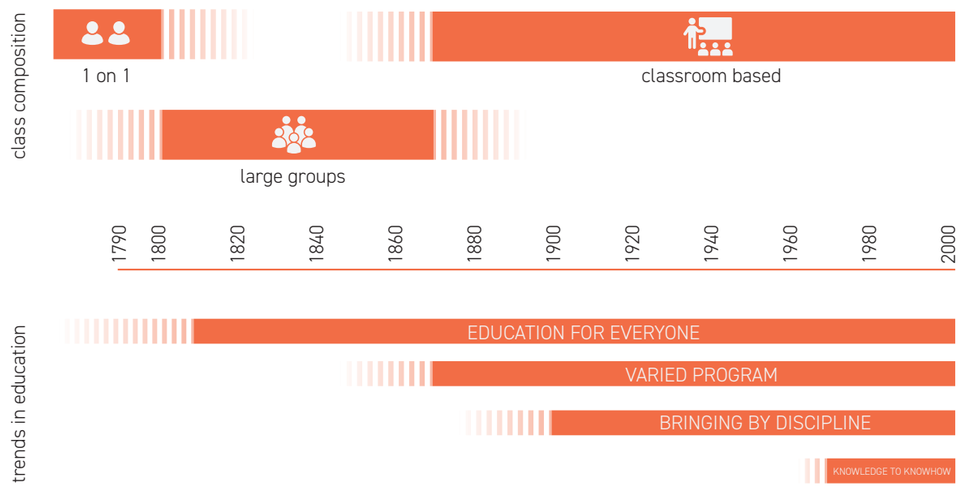


figure 01 - Global educational context

2.2 Architecture and Structuralism

As already explored in the introduction, all three architects are linked to structuralism. This also implies that all three buildings in this thesis are to be linked to the structuralist movement as well. This chapter therefore aims to find the principles of structuralism, so that these principles can be used to analyze and compare the three school buildings. To define the characteristics of structuralism, firstly a brief history of the emergence of the movement will be researched, to find out what the aims and ideas are. Thereafter the characteristics will be discovered, setting a baseline for the methodology later used in the analysis of the three school buildings that are being researched.

The History of structuralism

Structuralist ideas started to form during the start of the 20th century. On the one hand, architects were following the traditionalist Berlage, who just completed his stock exchange building in Amsterdam in 1903. On the other hand, some architects were striving for a more functionalist approach and joined "*het nieuwe bouwen*" and later in 1928 the first congress of the CIAM. Somewhere in between the two movements, there was a synthesis of architects criticizing the traditionalist architecture for covering up the structure and the modernist architects for preferring aesthetics over the structure. (Van Heuvel, 1992, p. 8) Over the years criticism increased, especially after the fourth congress of CIAM in 1933, which resulted in the charte d'Athene proposing strict separation of the functions of dwelling, working, recreating, and traffic. (Zahle et al., 2012, p. 19) This separation of functions eventually led to a lack of flexibility, resulting in more resistance against the principles of the CIAM. In 1952 during a CIAM congress this was brought to attention by Van Bodengraven '*We are facing a challenge to design structures or forms that can develop during the time of use, which are able to be one coherent whole after they are built and during their development over time. The absence of this must lead to self-destruction.*' (Van Heuvel, 1981, p. 392-393)

Shortly after this congress the forming of Team X began, members of this team included Jaap Bakema and Aldo van Eyck together with a small group of international architects. They saw urban design not as a result of the separation of functions anymore, but instead as a materialized form of relations. They were searching for a new architecture in which individual and social qualities were developed. The team eventually prepared the last and tenth CIAM congress in 1959 in which the organization was eventually eliminated. (Van Heuvel, 1992, p. 10) At the same moment as this final CIAM congress the first issue of forum under the new editors was released, focusing on '*the story with another thought.*' The most important figures amongst the editors were architects Aldo van Eyck, Jaap Bakema, Herman Hertzberger, and Dick Apon. The influence of this magazine in the Netherlands was big and resulted in the architecture that was called "*forumarchitectuur*" at the time. (Van Heuvel, 1981, p. 392) Most editors were also educating at the Academic of building arts in Amsterdam, influencing talented students like Piet Blom and Jan Verhoeven. The type of architecture they were opposing was aiming towards an architecture and urban planning that was based on social relationships, using a mixture of functions, higher densities in build mass, the integration of interior, architecture and urban planning, and interconnectedness of smaller and bigger scales. (Smit, 2018, p. 85) In the first issue of forum, the Burgerweeshuis in Amsterdam (1960) was used as a big example of their vision on architecture. This project was later designated as the first structuralist project in many publications. Eventually, in 1976 the movement mentioned as the term structuralism was elaborately described in an issue of bauen + wohnen by a former student of van Eyck, Bakema, and Hertzberger. (Van Heuvel, 1981, p. 392) During this period of the 1970s the exchange of ideas on structuralism slowly faded, resulting in the movement working with old ideas up to the 90s when designs still had ideas lent from the structuralist movements but could not be called structuralist anymore. (Vermeulen, 1993, p. 18)

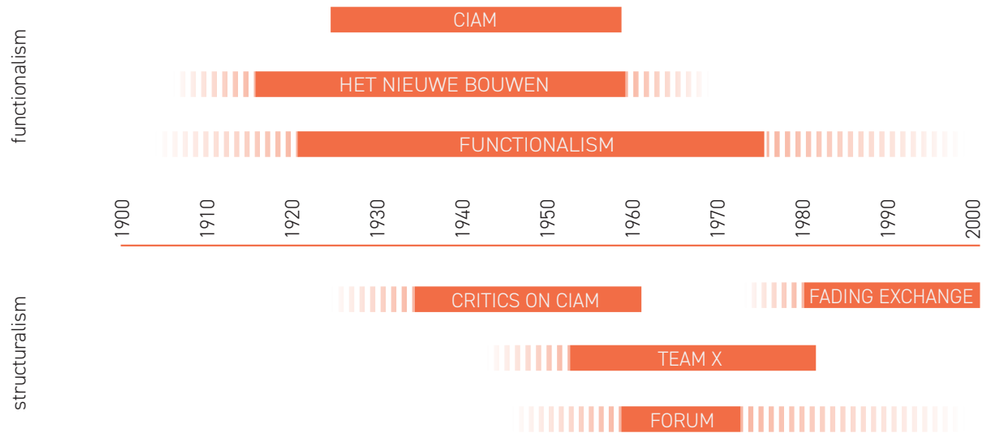


figure 02 - Global history of structuralism

Common Design Principles

In a broad context, structuralism can be described as designs and buildings that can interact, grow and adapt. The buildings can be recognized by their vivid open structures, the composition of small units, and spatial organization like a city. (Spoormans et al., 2020, p. 7) Another definition is given by Huisman: Although structuralism seems complex the core concept of the movement is to be found in the structures of the buildings. Structuralism in its simplest form is defined as a grid of buildings from which the structure most of the time stays visible on the exterior. Inherent to this structuralist's way of designing is the flexibility of the design, matching a common theme in the 1970s, multi-functionality. (Huisman, 1992) The most elaborate description of structuralist design characteristics is however, given in an issue of the Polyteschnisch tijdschrift in 1981 by Wim van Heuvel. He states that the structuralist concept consists of the following elements: it should suit growth and coherence, constructed from the point of encounter, the structure must be visible, mixed-use, fitting in the urban fabric, and mutual interconnectivity of unities. (Van Heuvel, 1981, p. 393-395) Using this source a further description will be given below.

Growth and Coherence

The design should suit the expansion of the building without disrupting the coherence of the spaces and the design itself. The design is seen as not finished yet, which leaves space for the users to complete it.

Constructed from the point of encounter

Places for meeting and gathering should be at least as important as the specific spaces that the building is designed for. This should result in the spaces having more space than just the minimum measurements.

Visible structure

The structure should show the inhabitants of the building how it is made. The repetition of the structure allows one to connect to the "global measurements" of a building.

Mixed-use

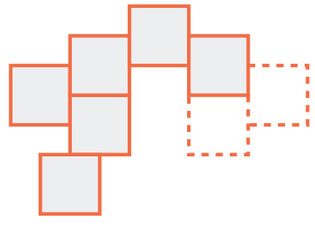
The building is fitted with varied use of space or parts of the building. For instance the brick wall next to the entrance for the mailman to put the package on, or for children to incorporate it into their games.

Fitting in the urban Fabric

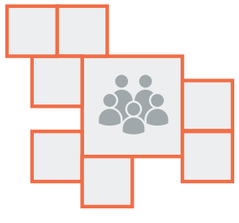
Big projects should be divided into smaller human scale based elements, relating to the existing urban fabric. Streets and roads can be continued inside of the building making inside and outside coherent.

Interconnectivity of unities

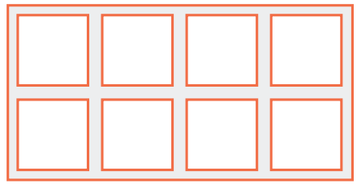
Parts of a building can be clustered, like the kitchen and living room. These clusters then form a bigger cluster in the house. And multiple clusters of houses form a neighborhood or a city block. This gives structure on smaller and larger scales.



Growth & Coherence

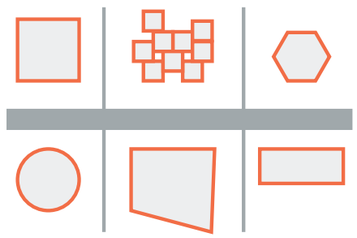


From the Point of Encounter

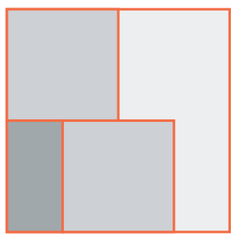


Visible Structure

Mixed Use



Fit in the Urban Fabric



Interconnectivity of Unities

figure 03 - Diagrams of design principles

2.3 Social Interaction through education and architecture

Now both the educational history of primary education and the history of structuralism are explored, a possibility is available to compare both elements to see how they work together, creating social interaction. As seen in figure 04 for a vast part of the past two centuries the focus on the architecture of primary educational buildings was not on social interaction. It is to be noted that during the 19th century, the primary school buildings gradually moved from all students in one room to more specialized education and the introduction of classrooms and classroom-based education. Up to the second half of the 20th century, the experience of the students was not considered yet when designing the buildings they were educated in. The focus during that time was on creating hygienic spaces, with enough air ventilation and heating for the amount of students in the classrooms. (Steijns & Koutmanis, 2004, p. 19) This can be linked to the movements of "*het nieuwe bouwen,*" modernism, and the resulting CIAM, which was focusing on architecture that was influenced by the thought of light, air, and space. Just after the CIAM was founded in 1928 the focus of education shifted towards stimulating a feeling of togetherness amongst the students, with the aula as the central heart of the primary school buildings. In a way this seems contradictory because the modernist movement and the CIAM were focused on the strict separation of functions, creating in many cases unpleasant spaces to dwell in, it can be therefore stated that education in the Netherlands was ahead of its time compared to architecture.

The true link connecting architecture in the form of structuralism and education occurred from 1950 to 1952. During this period more varied programs of education were allowed and the criticism on the charte d'Athene increased significantly. New forms of education, like the Montessori and Jenaplan required new architecture, that suited their view on primary education. At the same time the "forumgroup" was working on a new architectural movement (later called structuralism) with a focus on design based upon the human scale and facilitating human encounters in their buildings. Eventually, education and architecture merged in the three buildings by Hertzberger, Bakema, and Verhoeven amongst other examples. The primary school buildings: 't Ronde, Apolloschools, and de Schalm all share the common visions of education, containing the aula as the central heart (indicated in grey in figure 04) and stimulating social interaction through the structuralist type of architecture. Eventually, after structuralism faded away, the imprint it made on social interaction remained to stay upon today.

Although the characteristics of structuralism can be defined in six ways, not all of them will be useful for further analysis of the three school buildings that are subject to this thesis. The three themes that have the most to do with the evoking of social interaction are designs made from the point of encounter, mixed-use, and the interconnectivity of unities. These three characteristics are all based on humans, human scale, or interactions that can happen between humans. The other three characteristics are more technical in their approach and although they contribute to the wider concept of structuralism, they are too broad and general to use as a tool for the analysis of the three elementary schools.

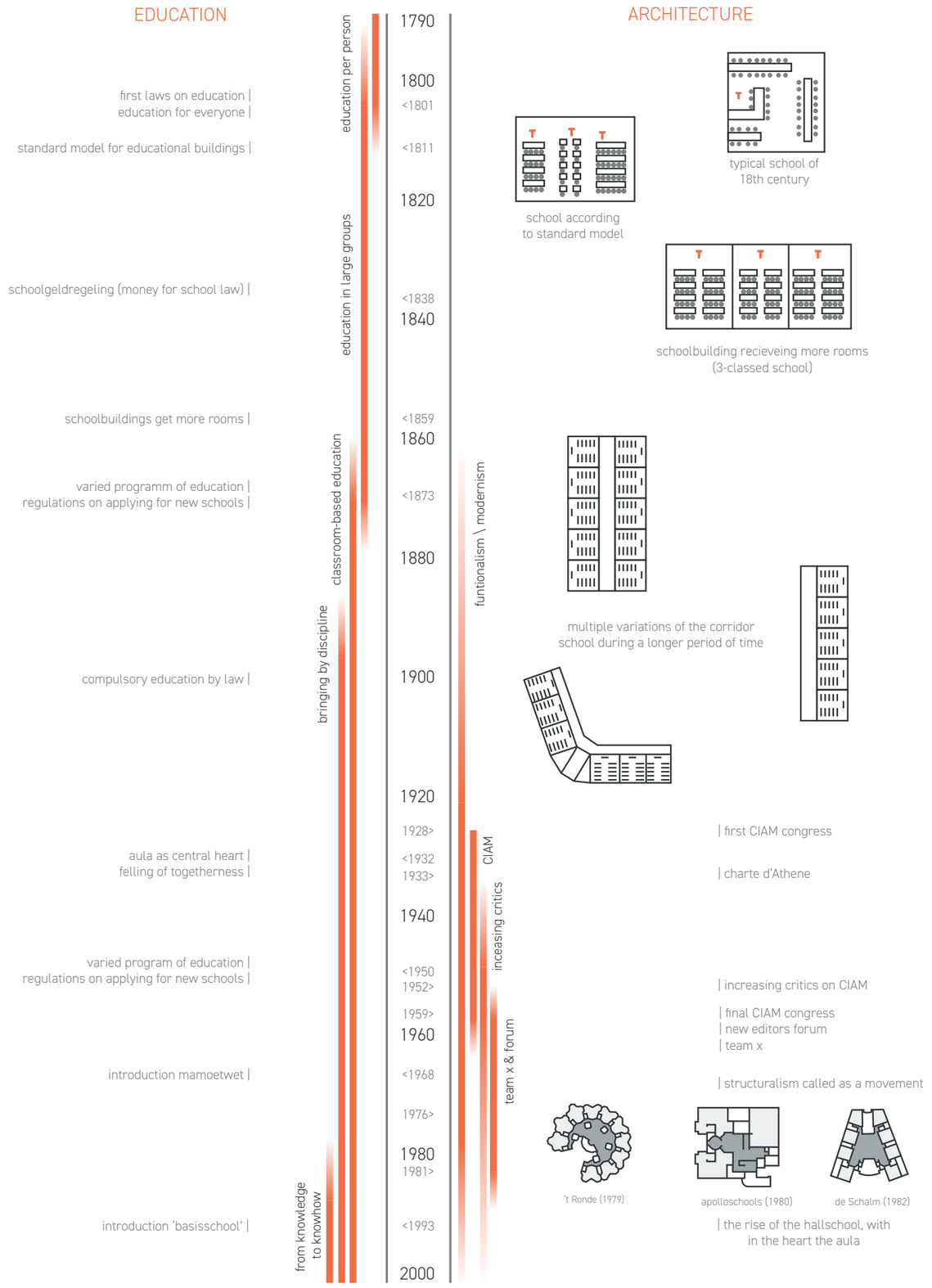


figure 04 - Educational and architectural History of Primary education and structuralism

3. ‘t Ronde, Jan Verhoeven

The first school that will be analyzed is the elementary school ‘t Ronde designed by architect Jan Verhoeven. In this chapter there will first be a general description of the project, followed up by an analysis of the ideas of the architect on social interaction and the creation of spaces that evoke them. After this context is explored an analysis will be made on the elements that evoke social interaction based on the three levels as defined in the introduction: two students, the class, and the entirety of all the classes and tutors in the building.

3.1 Building description & concept

The Montessorischool ‘t Ronde designed by architect Jan Verhoeven in 1978 and completed in the same year was based on a simple design brief. The building should encourage the creativity of the students or in the words of the client ‘*The child should be stimulated to get the desire to play, to play theater, make music, to dance, paint and build.*’ (Zahle et al., 2012, p. 130) The school building originated from a private initiative by a couple of parents who were interested in Montessori education, which was focused on individual and independent work, stimulated by specially designed materials to suit the method of education. The organization started as a kindergarten in 1976 and eventually expanded to the need of building a new school. (De Valk, 1986) Although the setup of the educational method seems individual according to the description, the opposite is true. The building offers space for working in groups and working individually, a lot of attention was paid to facilitating groups of varying sizes to work as well as workplaces for individual work. This manifests itself in the way the building was set up in multiple circles, from the enclosed classroom towards the inner ‘theater’ (Rodermond, 1980, p. 77-78) The concept of the theater was explained during the opening of the building by Verhoeven, he brought a book on the old Greece, which he used to show a picture of the amphitheater in Epidaurus to the children. (Leusder krant, 1979) Besides this double-story height theater, which can be divided into two elements for creativity and storytelling, the building also includes eight classrooms and a balcony on the first floor that has space for working in smaller groups or individually. Besides these indoor spaces there is also a connection with the outside and nature in the form of the square in front of the school, but also with doors in the classrooms, offering the possibility to have class outside. (Zahle et al., 2012, p. 130)

figure 05 - Exterior, t’ Ronde - Verhoeven 1979

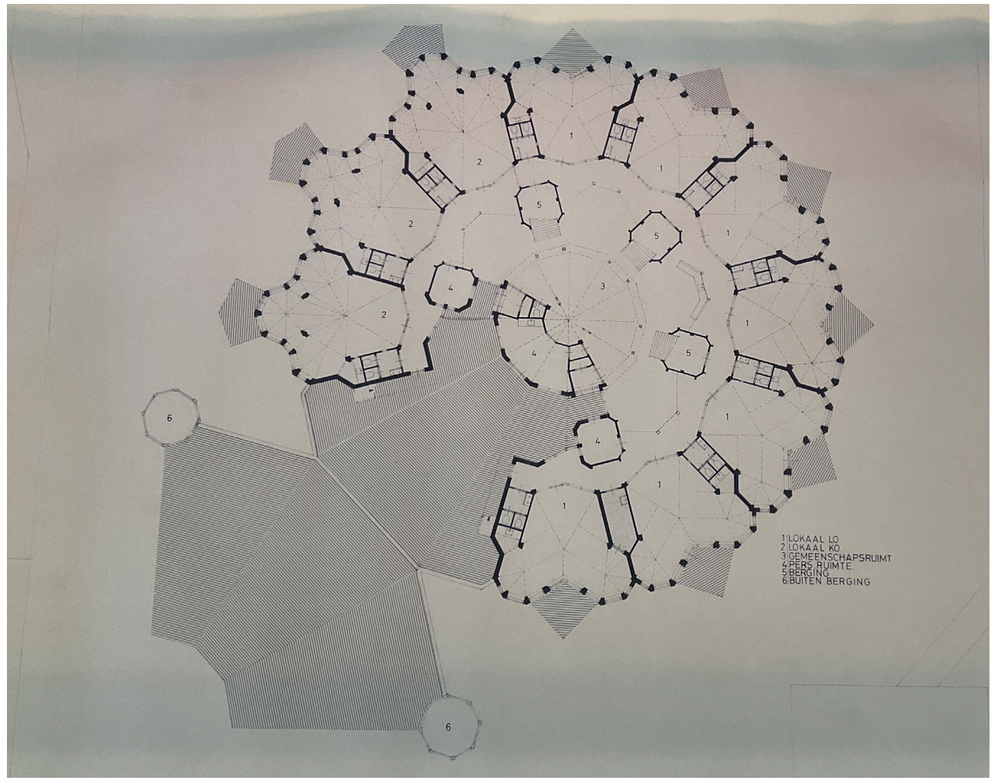


figure 06 - Ground floor, ‘t Ronde - Verhoeven 1979

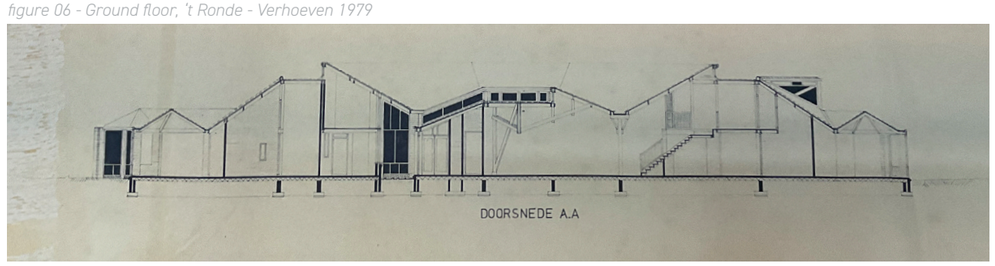


figure 07 - Section ,’t Ronde - Verhoeven 1979

3.2 Architects' view on building

Jan Verhoeven's work can be summarized into just one main theme of thought, individual parts are always placed around the shared parts of a building or design, and this shared place is then open to the public realm. Verhoeven describes this in his own words as '*arranging is placing relationships between people.*' (Zahle et al., 2012, p. 9) He also recognizes the need for privacy in certain moments and facilitates that in his architecture, instead of forcing people to interact all the time. '*The dwelling is important, you should be able to look outside from a safe place, but outsiders should not be able to look inside. In this way, you can determine yourself when you want contact with others on a completely voluntary basis.*' (Janssen, 1977) In this case, Verhoeven described his view on housing, but he approaches educational buildings in the same way. '*What I try to make are communities. This has everything to do with the relationships we have amongst each other. A school should be a space that encourages you to do things.*' (Roos, 1976) Continuing on the "doing" Verhoeven even goes as far as students may even be distracted by his architecture, seeking inspiration and personal development. '*The atmosphere in my schools should encourage the students to be fascinated all the time, meaning that they will be inspired. There should be a lot to look at, classrooms should be inviting to decorate for imaginative use.*' (Zahle et al., 2012, p. 130)

3.3 Social interaction through structuralism

Now the general architectural concept of 't Ronde and the view on architecture of Jan Verhoeven is explored, the analysis of the building through a structuralist lens can be carried out. First and foremost the building will be analyzed based on the most meeting-oriented characteristic, design from the point of encounter. This will then be followed up by an analysis of the spatial arrangement of unities and their interconnectedness.

Design from the point of encounter

't Ronde is designed with multiple levels of encounter in mind, this corresponds with the view of Verhoeven that people should have places for their own as well as spaces for collective and public usage. The spaces in this school building are designed based on the three levels of meeting, in the form of a small group of students, the class, and the entirety of all the classes and tutors. The central heart of the building, indicated in figure 09 offers the possibility for meeting in all three categories. Starting with the smallest sizes of groups, students have spaces on the balcony to work at. This can be seen in figure 08 in which there is a table for a maximum of 4 students adjoining a bookshelf. In this same image on the left side, a bay is visible, which is also offering a place for students to sit in smaller groups of up to 4 students. This bay is also part of the dormer, that looks over the surroundings of the school.

Verhoeven confirms this in an interview with the Leusder krant: '*Children can retreat themselves on the balcony. Alone or with another to work in the document center, to read a book, or to make a little*

figure 08 - View over balcony, 't Ronde - Verhoeven 1979

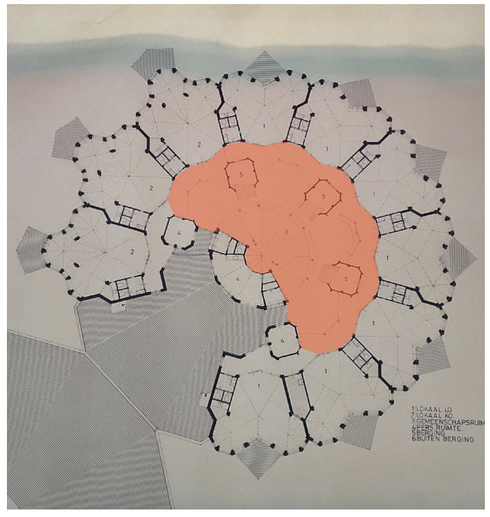


figure 09 - Central heart, 't Ronde - Verhoeven 1979

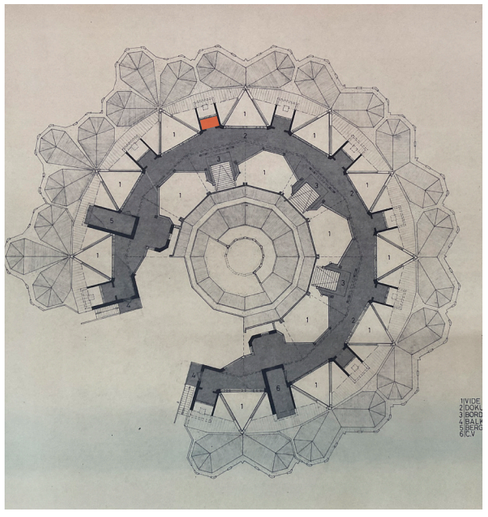


figure 10 - First floor, 't Ronde - Verhoeven 1979

assignment that needs them to concentrate. Children enjoy these little bays and corners, it is a certain emotion for them.' (Leusder krant, 1979a) In a letter found in the Nai archive a student explains why she likes to work on the balcony: '*The most enjoyable place in the school: upstairs, because you can work there really good, besides, it is fun working there as well.'*

On the ground floor of the central heart most of the time the classes are meeting inside their dedicated rooms. In these rooms, a group of children will meet in smaller groups of three to four students. The central heart however facilitates the meeting of students in bigger groups as well. The room can be divided into two spaces, a place for handicrafts and a place for theatre and speaking. This is also visible on the plan and in figure 11, on the right side, there is a workbench drawn that will suit the handcrafts, while the other side leaves the space open for the interpretation of the children. The fact that these two activities can be held at the central heart of the building also means that children of varying ages will meet and interact, which is also at the heart of the Montessori view on education. Verhoeven calls this in an interview the following: '*The children are getting on the podium every day. We are all playing our role on the podium in the society. Theatre is part in all of us.'* (Leusder krant, 1979a)

During bigger events in the building that requires the most space for the entirety of all the students and tutors the central heart, including its stairs and balcony is used for meeting. The stairs and balconies offer space for students to sit on and listen to their tutors. This is confirmed by the letter of a student, '*The most enjoyable, most fun place of the school is on the balustrade, because je can lay down and listen to the week closure.'*

figure 11 - Stair in use during event, 't Ronde - Verhoeven 1979

figure 12 - Workbenches in the central heart, 't Ronde - Verhoeven 1979

figure 13 - Central heart, 't Ronde - Verhoeven 1979

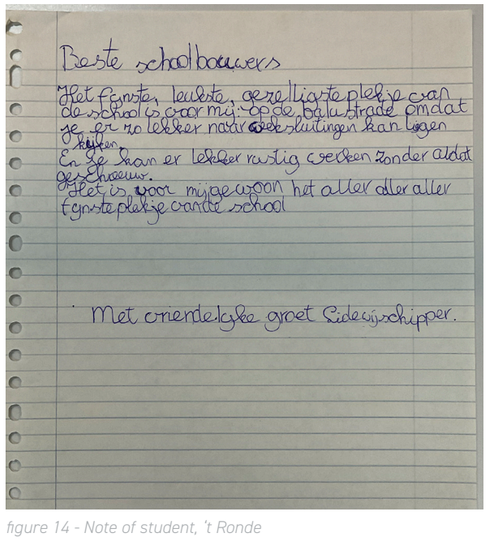


figure 14 - Note of student, 't Ronde

Interconnectivity of unities

In the case of this building, ´t Ronde, there are many unities to be found. On a global level, the building can be divided into three rings (figure 15), the outer ring (red) containing the classrooms, the middle ring (blue) with space for bigger groups to meet in the form of crafts and speaking, and the inner ring that carries the function of the theatre. The outer ring can be further divided into classrooms, which respectively can be divided into smaller groups the architect calls "kapelletjes" which translates into little chapels. He describes this as follows: '*The school building exists of many small little chapels, pavilions around the communal area in which the students can join each other in groups. The whole back façade of the school is being formed by these small chapels. These chapels for groups of three children are combined to form bigger groups. These bigger groups cumulate into the point of gathering, the theatre, in which all people/ children come together.*' (Leusder krant, 1979a)

This description of the architect explains a regular day at the moment the school building is used in its most regular form, which is children having class or working in small groups or individually in the central heart. The function and unities of this central heart change when meeting with larger groups or the entirety of the school are held. In that case, the inner two rings (green and blue) adjoin, including the balcony on the second story to form one big unity that offers space for all students, tutors, and parents that join the meetings. This expresses that all smaller unities are interconnected and also shows the fact that the spaces are designed flexibly. This is not only true for the bigger submerged units in the building, but also for the smaller ones, like the stairs that are combined with the storage units. During regular use, these stairs are used for reaching the balcony while during meetings they change to a stand on which the children can sit to look at the tutor or the play (figure 11) that is happening in the center of the school building.

Besides the unities that make up the central heart of 't Ronde, there are many more to be found in and around the building. A final example is shown in figure 16 which shows how the unit of a classroom (red) is built up out of smaller units the toilet (blue) and the classroom itself (Yellow) this can even be spliced further into the little chapels that are shown in figure 17. Outside of these classrooms in green the crafts workshop is illustrated, sandwiched between two stairs, the classrooms, and the theatre. It can be therefore stated that this building could be seen linearly, from the more private outside ring towards the communal theatre in the inner ring and if this illustrational line was continued even further through the courtyard towards the public street is reached.

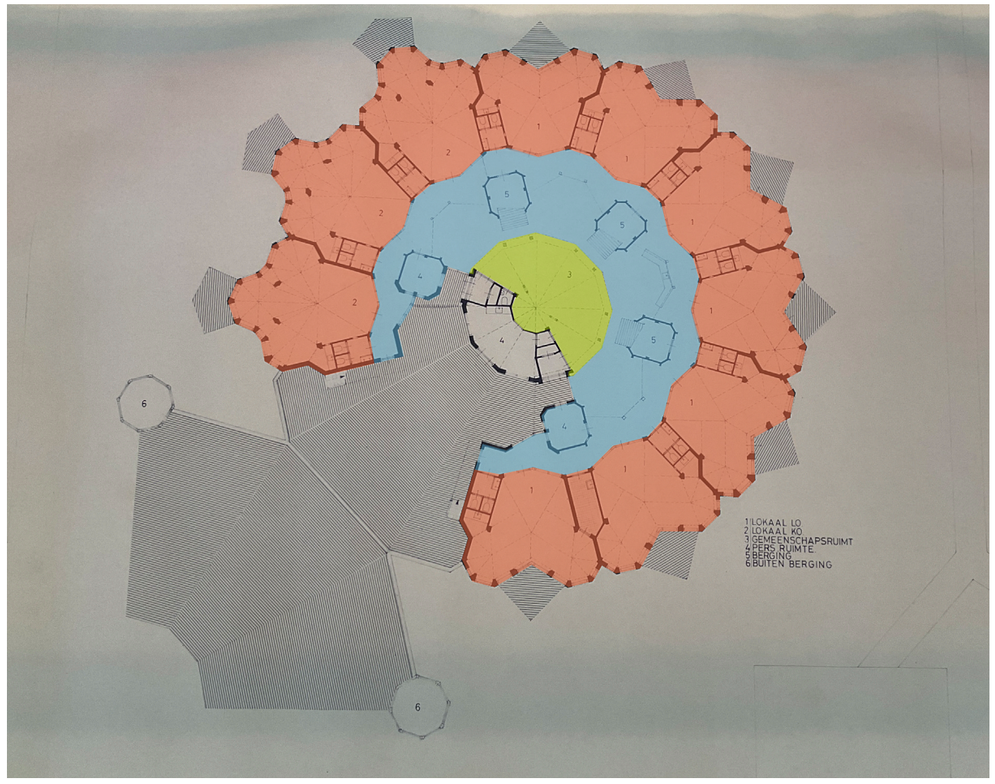


figure 15 - Three rings in the building, 't Ronde - Verhoeven 1979

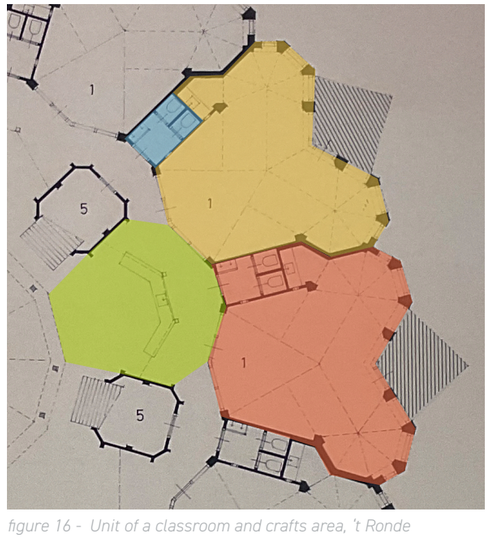


figure 16 - Unit of a classroom and crafts area, 't Ronde

figure 17 - View into a little chapel, 't Ronde

4. Apolloschools, Herman Hertzberger

The second schools that will be analyzed are the primary schools, also called Apolloschools in Amsterdam designed by Herman Hertzberger. The school buildings are divided into a Montessorischool and a more traditional school with a conventional educational program that was present during the time the building was realized. In this chapter there will first be a general description of the project, followed up by an analysis of the ideas of the architect on social interaction and the creation of spaces that evoke them. After this context is explored an analysis will be made on the elements that evoke social interaction based on the three levels as defined in the introduction: two students, the class, and the entirety of all the classes and tutors in the building.

4.1 Building description & concept

The Apolloschools designed by Herman Hertzberger in 1980 and completed in 1983 are two primary schools with an identical spatial program. The project is situated in Amsterdam in an old and flourishing green belt in the renowned Berlage district. (Hertzberger & De Swaan, 2009, p. 154) The two buildings are developed from one method of building and built using the same construction method as twins. Even Though both school buildings are similar in many ways they are also different as a result of the two approaches the views on education of the two institutions and their orientation on the plot. (Bouw, 1984, p. 211) The buildings are the result of the merging of smaller elements (the classrooms) with the large central hall, which makes the building work as a whole. This central hall is then nuanced by smaller places, which are for instance places to work. (Solomons, 1983a, p. 62) One of the important factors in the briefing of the schools was that it should feel like a living room, which was one of the deciding elements in the introduction of the central hall. In an interview with Parool Jeanette Tiemersma, head of the Amsterdam Montessorischool stated the following about the central heart: '*It is the heart of the school. It is a sort of amphitheater ... The hall is used intensively, just as we have hoped when we were designing.*' (Solomons et al., 1987) Around this hall, the classrooms are oriented at the corners of the building in a split-level configuration. The building does not have corridors, the central hall and the galleries around it make one obsolete, making this central heart of the building lively in a social and spatial aspect. (Solomons, 1983b)

figure 18 - Exterior of Montessorischool - Hertzberger 1980

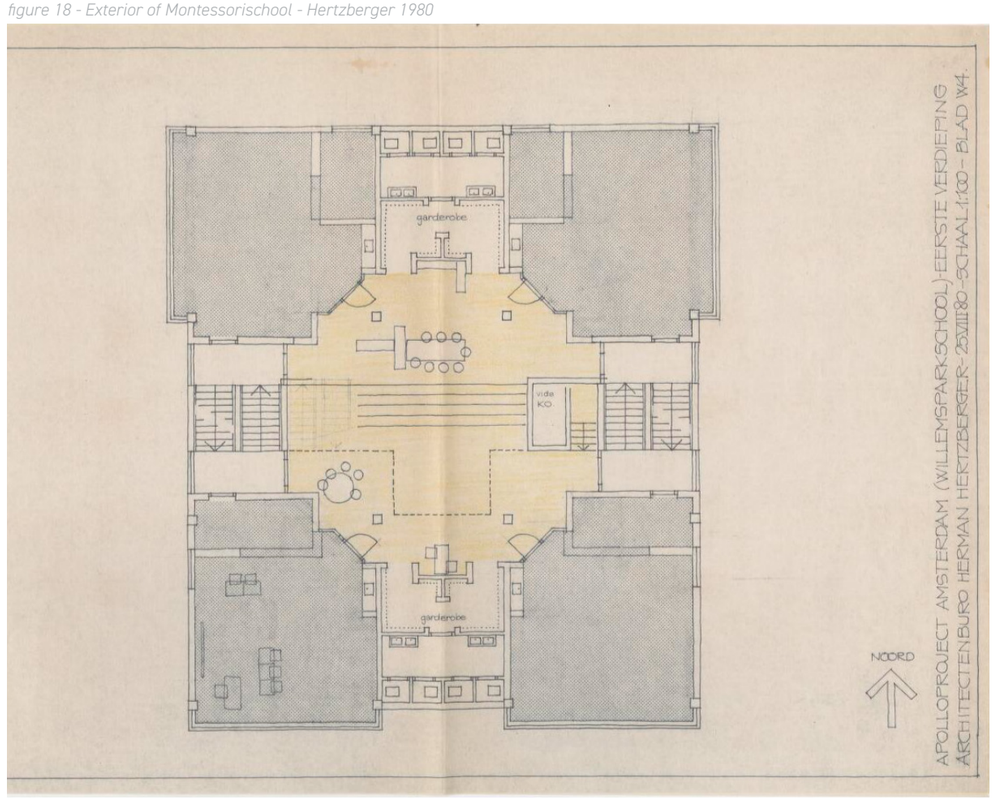


figure 19 - Plan of first floor Montessorischool - Hertzberger 1980

4.2 Architects' view on building

Herman Hertzberger is known for his designs that fit the people using them, this is illustrated clearly when he compares his buildings with shoes. '*I want first and foremost that people feel at home in my buildings like shoes should first and foremost be fitting. I hate shoes that look nice but dot fit well at all.*' This quote by Herman Hertzberger characterizes his way of designing, buildings always serving the people that are using them. (Huisman, 1987) In another interview, he goes as far as to state that when he designs buildings, looking at the form is definitely not his first priority. He starts by questioning how open the building should be and the atmosphere required for that. (Pam, 1983) When looking at school buildings Hertzberger likes to compare them to little cities, since school buildings also have got the realms of public, private, and collective. He sees the classrooms as the private and the central heart of his buildings as a collective in which the students have contact with older students which stimulates the everyday public realm in the outside world. (Hertzberger & De Swaan, 2009, p. 16-17) With the trend of school buildings becoming bigger and bigger Hertzberger also notes that the children should always feel at home, he therefore links the buildings to the house. They should be able to explore but not alienate from themselves or the building. (Huisman, 1987)

4.3 Social interaction through structuralism

Now the general architectural concept of the Apolloschools and the view on architecture of Herman Hertzberger is explored, the analysis of the building through a structuralist lens can be carried out. First and foremost the building will be analyzed based on the most meeting-oriented characteristic, design from the point of encounter. This will then be followed up by an analysis of the spatial arrangement of unities and their interconnectedness.

Design from the point of encounter

The spaces in and around the central heart, as indicated in figure 19 and 21 by Hertzberger himself in yellow, are designed with meeting and interaction in mind in and around the space. The fact that meetings can happen on multiple levels can be seen in the people drawn in the section of figure 21, figures are sitting alone, with two and more than two. The head of the school, Jeanette Tiemersma notes about the verbal and non-verbal communication in the school: *'There are endless possibilities of communication inside the central heart of the school.... This has a very positive result on the staff and students.'* This indicates that the central heart has a big positive effect on everyone using the school, she later states that the central heart is used intensively. (Solomons et al., 1987)

Starting with the smallest scale of meeting in groups of two there are multiple spots located around the perimeter of the large vide in the middle of the heart. In between two classrooms, porch-like areas are created in which a maximum of two students can retrieve themselves to work individually or together

figure 20 - Overview of the central heart Montessoirschool - Hertzberger 1980

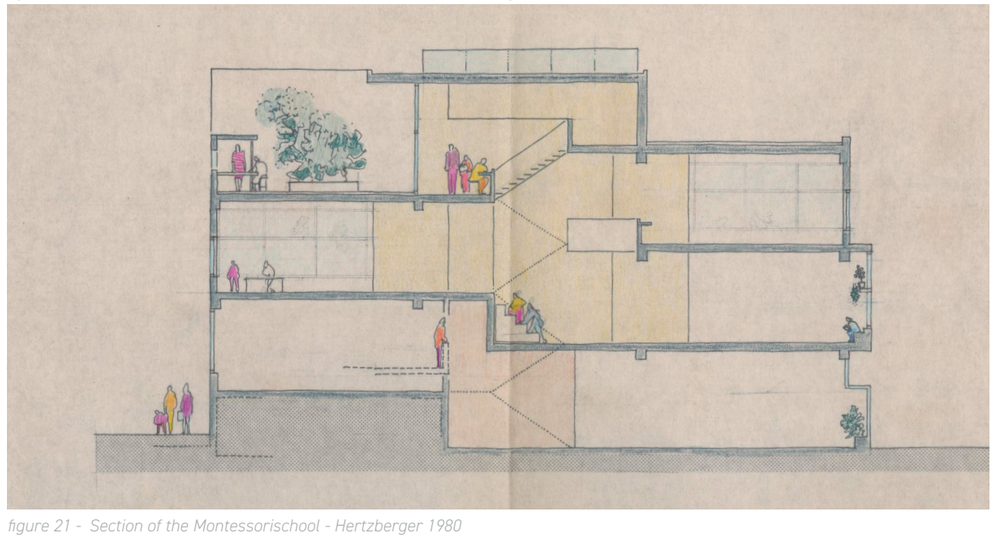


figure 21 - Section of the Montessorischool - Hertzberger 1980

on a small project, as seen in the sketch figure 23 and the photo in figure 26. Besides working in the porches the children can also meet up in the center of the building, which is designed like an amphitheater. (Hertzberger & De Swaan, 2009, p. 154) The central stairs on the lower level combined with the balconies on the upper levels stimulate social contact between children of different ages: *'It doesn't matter whether you are upstairs or downstairs if you stand still for a while you see children everywhere.'* (Solomons et al., 1987)

The same stairs can be used for meeting in small groups of two to three students and can also be used in a configuration with bigger classes. They can for instance have a theatre play or have lessons in painting as shown in figure 24. With these activities other students can watch along from the balconies, creating further social contact between the groups of different ages.

Finally, on the point of meetings coinciding with all of the children and tutors combined the amphitheater-inspired stairs are playing an important role. Interestingly the balconies encircle the complete central heart and offer not only views towards the podium but also straight over the top of it as seen in figure 25. These stairs combined with the many balconies thus offer a varying platform for meetings like week-closures and other festivities requiring the whole school to listen.

figure 22 - View from balcony, including workplaces for tutors (right) - Hertzberger 1982

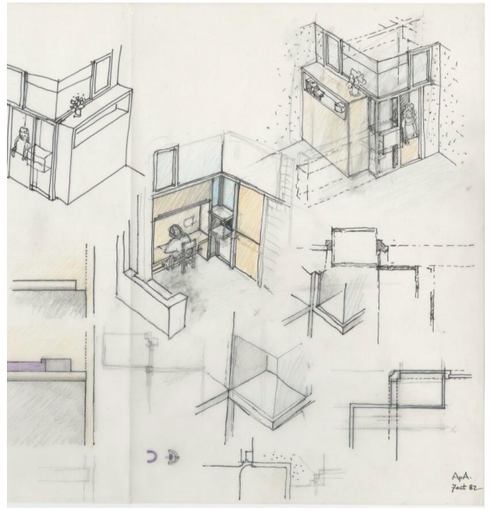


figure 23 - Sketch of the porch - Hertzberger 1980

figure 26 - Students working in porch - Hertzberger 1982

figure 24 - Painting lessons - Hertzberger 1982

figure 27 - Following lecture on stairs - Hertzberger 1982

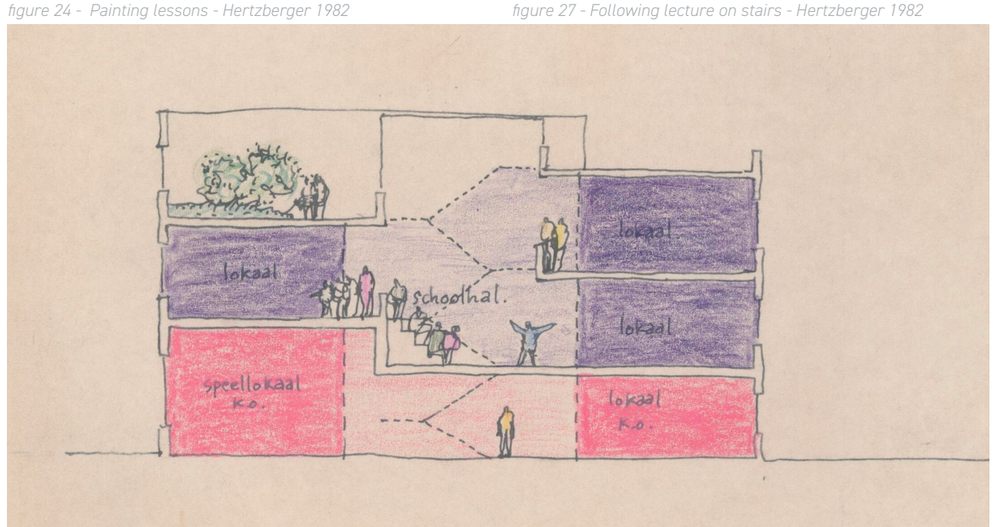


figure 25 - Section showing meeting in larger groups - Hertzberger 1980

Interconnectivity of unities

The primary schools of Herman Hertzberger in Amsterdam have a simple layout when looking at the floorplan. On a global level, the building can be divided into three zones as seen in figure 28, the central heart (yellow) the classrooms (grey), and the functional zones (left in white) that houses the toilets and stairwells. Although this thesis focuses on the central heart it is in fact the coming together of the classrooms and the central heart of the school building that offers the most interesting unities. The small porch spaces that allow students to work in pairs or alone are for instance one of these spaces created in the realm between the central heart and classrooms. Figure 29 shows the floorplan of a classroom on the second floor, with in purple the workbenches for the students, cleverly integrated in the fragment of the classroom that is indented in the corner. The green area in that same plan illustrates a lowered ceiling, making the unity of the workplace a bit more cozy and friendly to the children. This space might be seen as the outdoor classroom but continues after the lowered ceiling up until the round column that demarcates the realm of the classroom.

Another example of an in-between space is the bookshelves and the library on the top floor as seen from the perspective drawing taken from the second floor looking upward. Hertzberger took in this case advantage of the split-level design of the building to use the lower ceiling height that resulted from this building concept to create a concealed space for reading books. The height and location of this space make sure the children can read books in a concentrated way, without too many distractions, while not feeling displaced from the central heart of the building.

This building by Herman Hertzberger doesn't have a clear separation of unities apart from the three main elements. On the places these elements meet, Hertzberger carefully created spaces for children to dwell and work, making the places function as standalone elements while still being part of multiple realms of unities.

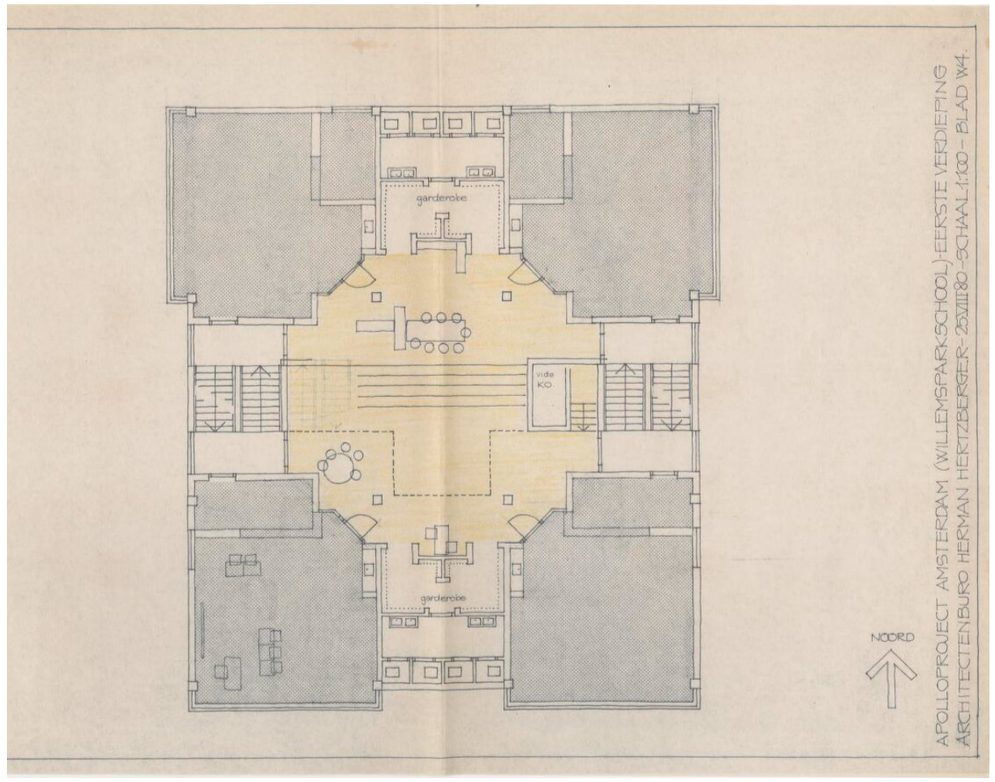


figure 28 - Plan of first floor Montessorischool - Hertzberger 1980

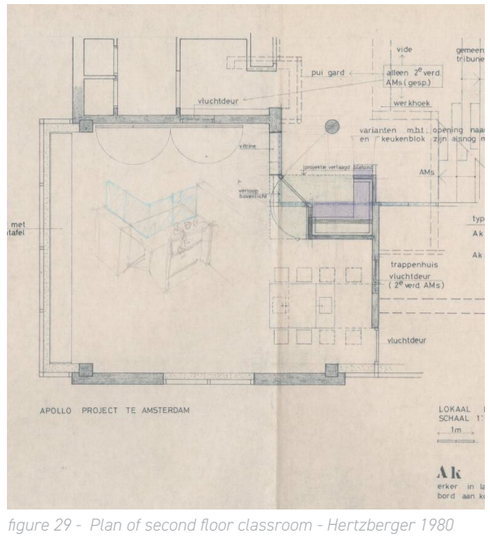


figure 29 - Plan of second floor classroom - Hertzberger 1980

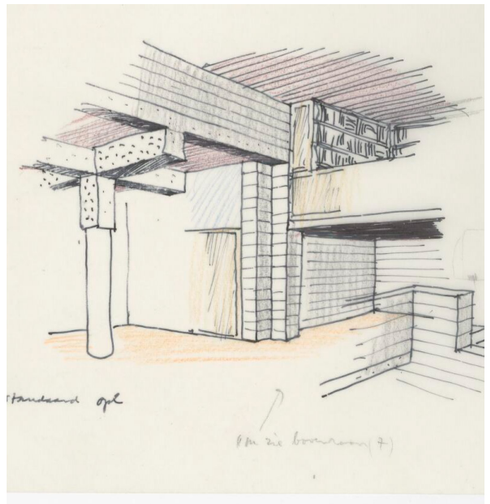


figure 30 - Perspective drawing bookshelves - Hertzberger 1980

5. De Schalm, v/d Broek en Bakema

In this chapter the third school building, the public primary school De Schalm designed by Architectenbureau van den Broek en Bakema will be analyzed. The building is part of a project housing two primary schools in Katendrecht-Rotterdam, one a catholic primary school and one a public primary school, which indicates that the school is open for all students and tutors and do not educate from a belief or philosophy of life. (Ministerie van Onderwijs, Cultuur en Wetenschap, 2023) In this chapter there will first be a general description of the project, followed up by an analysis on the ideas of the architect on social interaction and the creation of spaces that evoke them. After this context is explored an analysis will be made on the elements that evoke social interaction based on the three levels as defined in the introduction: two students, the class, and the entirety of all the classes and tutors in the building.

5.1 Building description & concept

The public primary school, OBS (Openbare Basisschool) de Schalm designed by the architects firm Van den Broek & Bakema, was completed in 1982 in the Katendrecht district of Rotterdam together with another primary school in the same district based upon a similar shape and approach. The public primary school de Schalm was going to consist of multiple schools: de Brug, the van Duijlschool, and an orphanage, De Hofstede. (Het vrije volk, 1983) This later changed when the contractor went bankrupt in 1985 and resulted in the project being postponed. The type of schools was also changed now being a catholic primary school, De Regenboog, and a public primary school De Schalm. (Het Vrije Volk, 1985) Eventually, a new contractor was selected to finish construction making both organizations able to move in on the 16th of September 1987. The concept of the building was then to have both schools under one roof but still operates using their own educational methods and systems. (Het Vrije Volk, 1987) The wedge shape of the building is a direct result of these two organizations that needed separate entries for access to their part of the building. The surrounding triangular-formed street pattern also influenced the shape of the building and the floorplan. The entrance of the orphanages is separated on both wings, while the entrance of the primary schools is located at the central point of the wedge-shaped floorplan. (Bouw, 1988)

figure 31 - Exterior of OBS de Schalm - v/d Broek & Bakema 1982

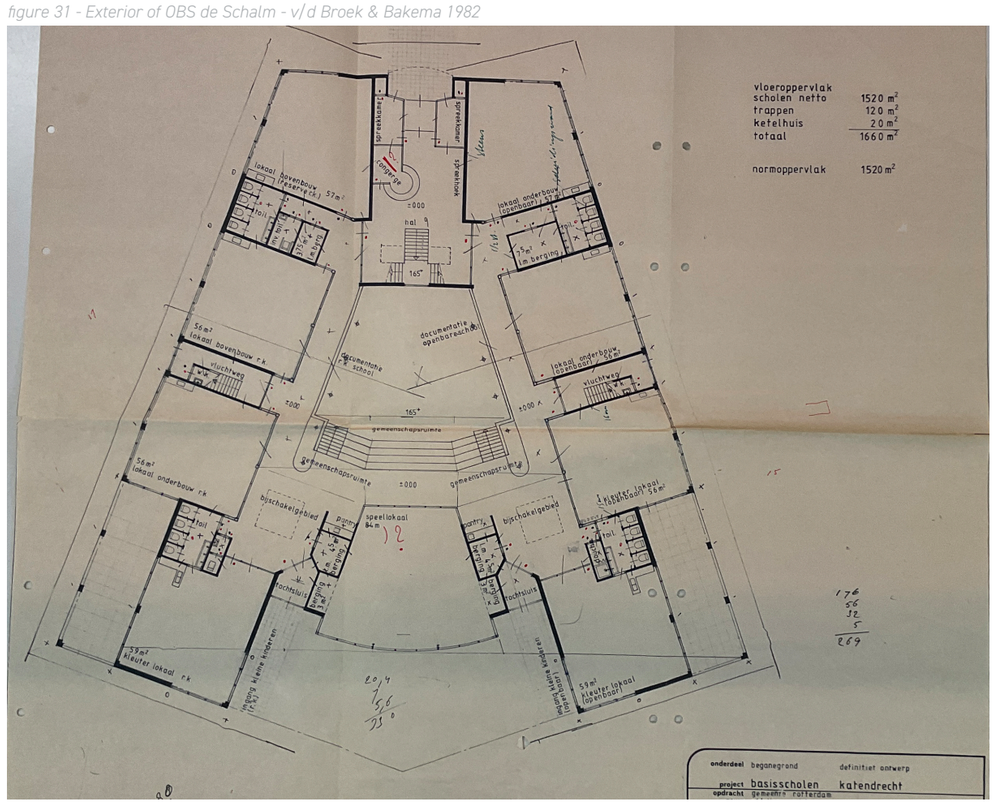


figure 32 - Ground floor of OBS de Schalm - v/d Broek & Bakema 1982

5.2 Architects' view on building

Because the architects' firm did not design a lot of school buildings they have not written a lot on their philosophy on this specific typology of architecture. This however does not mean that the architect didn't have a vision or a clear idea about their architectural designs. Their views on other typologies and architecture, in general, can therefore be implemented into their school building, which is the basis for this chapter. Up to and during the second world war Van den Broek and Bakema designed conform the modernist principles of 'light, air, and space,' during this period the office was also competing with a lot of megastructures that were common during that time. After the second world war, modernist thinking made place for another philosophy: '*The story from another point of thought.*' This new way of thinking about human relationships to space and relations and functions inside this space was the main point of focus. The living environment of the individual should be designed as part of a bigger community. (Ibelings, 2000, p. 32) Jaap Bakema later called this the "*open society*" of which he gave a description in 1961 '*hidden potential of our new social structure of society.*' Again the focus is on shaping a larger whole in which individuals can still have their own realm. (Van den Heuvel, 2018, p. 19) He later continues with this thought and again emphasizes the relations on a bigger scale from chair to city, explaining that '*feeling at home*' in the space calls for configurations where that need has to be taken into consideration in the design. (Van den Heuvel, 2018, p. 76) Based upon the statements by the architects it seems the firm is looking more into the bigger relationships, not only inside of the building, but especially with the surrounding city.

5.3 Social interaction through structuralism

Now the context of the building and the philosophy of the architects are clear the school building can be analyzed through the structuralist principles of design from the point of encounter and the interconnectivity of unities. In this first topic, the relations of meeting will be analyzed in three categories, thereafter an analysis of the interconnectivity will seek for relations of unities that stimulate meeting and social interaction. Since the buildings have not been documented very elaborately most analysis will be made by using graphical additions to the plans and sections of the actual building.

Design from the point of encounter

Since the school is organized as a traditional public elementary school with a tight budget the building does not have a lot of space for meeting. The architects have however tried to incorporate some elements that stimulate encounter and thus social interaction. On the first level of two students interesting spots in and around the central heart are present. The first spot is on the stairs, that has convenient seating height, that can be used as a place to work at. This is seen in figure 33, in which the center of the stair has a specific form for seating. The other spot visible in figure 33 are the slanted elements between the brick underneath the columns supporting the first floor. These slanted elements allow the students to lean against it while waiting in front of the class or just to hang out during breaks.

figure 33 - Interior of OBS de Schalm - v/d Broek & Bakema 1982

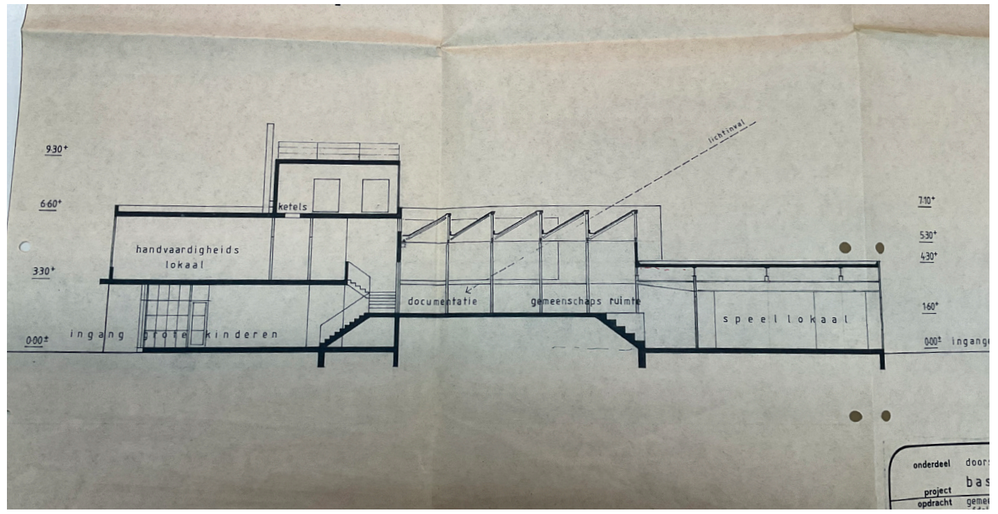


figure 34 - Section of OBS de Schalm - v/d Broek & Bakema 1982

When meetings are held with bigger groups of students or a class, the central stairs can be used. The outlook on the communal area is large enough to have a theatre play or another activity that can be carried out within a smaller group. With this size of groups, the function of the play area can be used simultaneously. Next to the playroom, there are so-called "bijschakelgebieden" which can be described as additional areas that can be used to educate in a more free space. These areas are also linked to the central stairs/bleacher stairs which gives options to the educators for the space they are able to use.

The foldable wall and the playroom come into play when meetings with larger groups or the entirety of all the students and tutors in the school building occur. During normal schooldays, the wall is closed, as is the case in figure 37, but when larger groups meet this wall can be opened to vastly expand the space of the central heart. This is illustrated in figure 35, which was a picture taken during the opening of the school building, having many parents and children present and listening to the ceremony. It is then also noticeable that the interior balconies are also in use, which makes the central heart function as a sort of amphitheater.

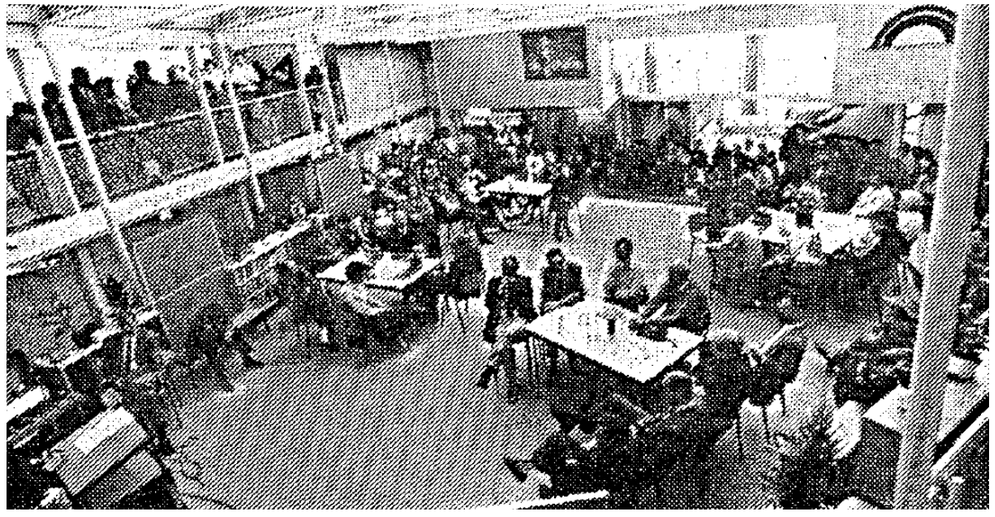


figure 35 - Meeting with large group during opening OBS de Schalm- v/d Broek & Bakema 1982

figure 37 - Interior of OBS de Schalm - v/d Broek & Bakema 1982

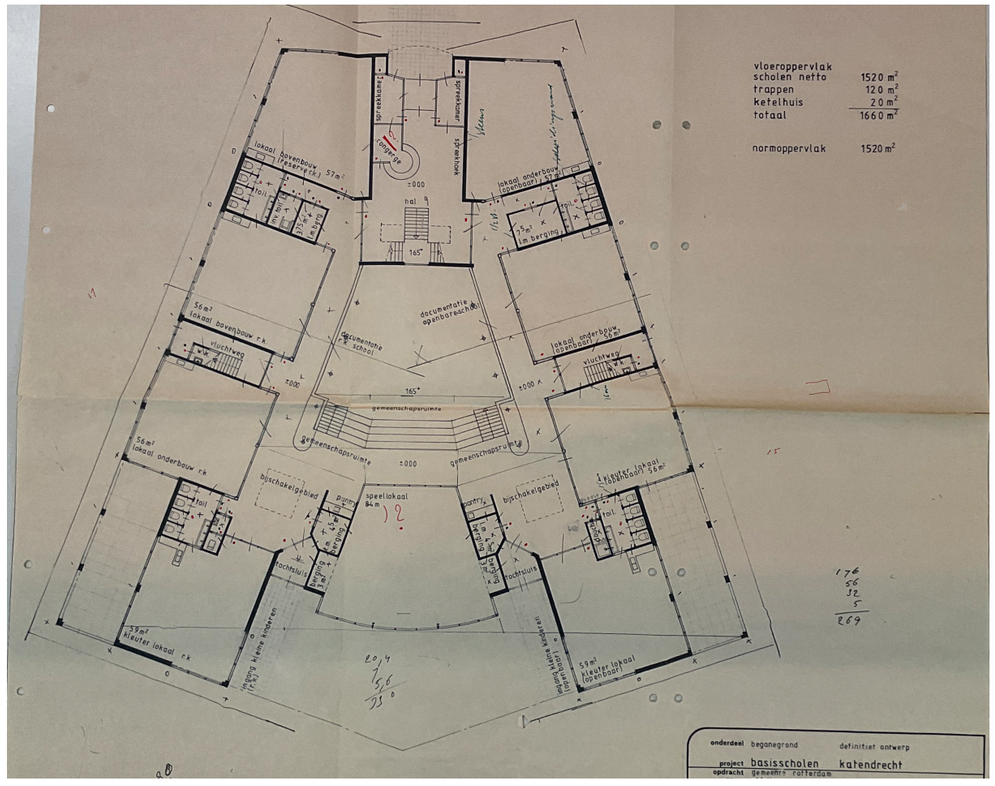


figure 36 - Ground floor of OBS de Schalm - v/d Broek & Bakema 1982

Interconnectivity of unities

Because of the traditional setup of the school's organization, there are not a lot of unities that have been interconnected with the central heart, except for using its space to access the classrooms. However, some elements in the building have connections that stimulate meetings throughout. In the first place, there is as stated in the previous paragraph the connection between the playroom (red) and the "bijschakelgebieden" (green) that allow the central heart to be expanded during larger meetings. During regular school days in which the children have classes, these areas will function according to their primary functions of education rather than gathering.

Another place where elements are interconnected is seen at the top side of the drawing (blue), which is used for the entrance area with the concierge and meeting rooms for tutors. This unity of hallway and stairs have a connection with the central heart and can figure as a backstage area during presentations that takes place on the podium which is the raised communal area in the heart of the building. Beyond those two areas, the balconies that serve as access routes for the classrooms on the first floor can serve as a viewing platform for the presentations in the communal area.

Besides the elements mentioned above all other unities, like classrooms, are standalone elements and don't have a strong relationship with the central heart. This is also the result of the communal area being raised above the ground floor level, making the classrooms and hallways beside it disconnect. There is still visual contact, but the spatial contact is lost due to the lack of a clear overview.

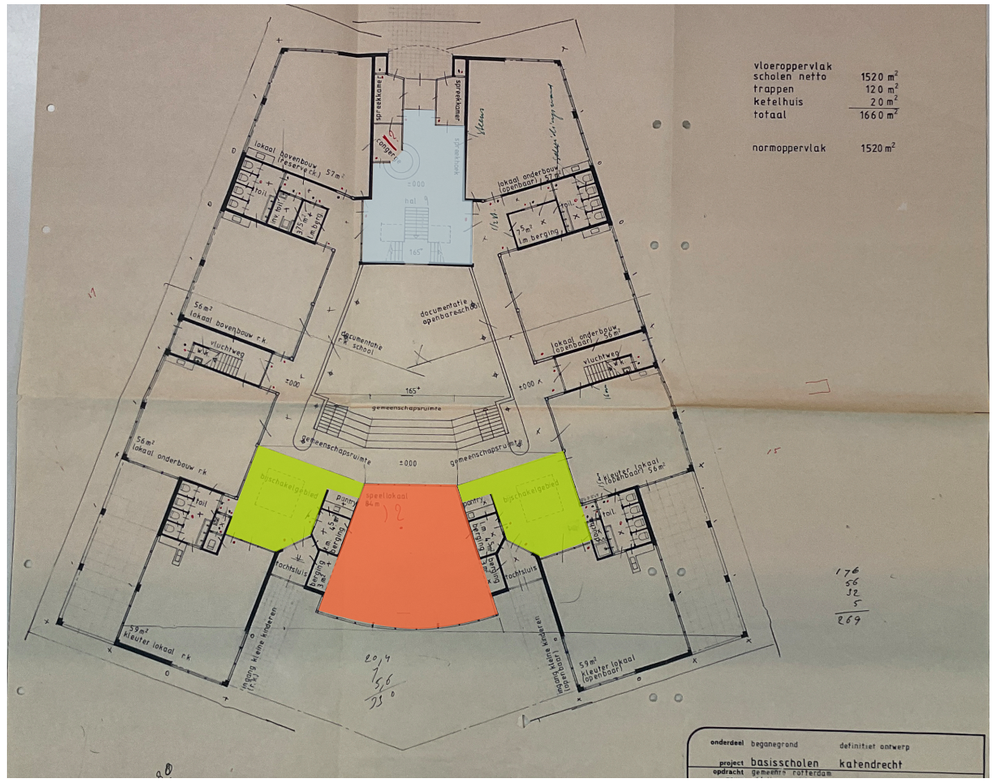


figure 38 - Ground floor of OBS de Schalm - v/d Broek & Bakema 1982

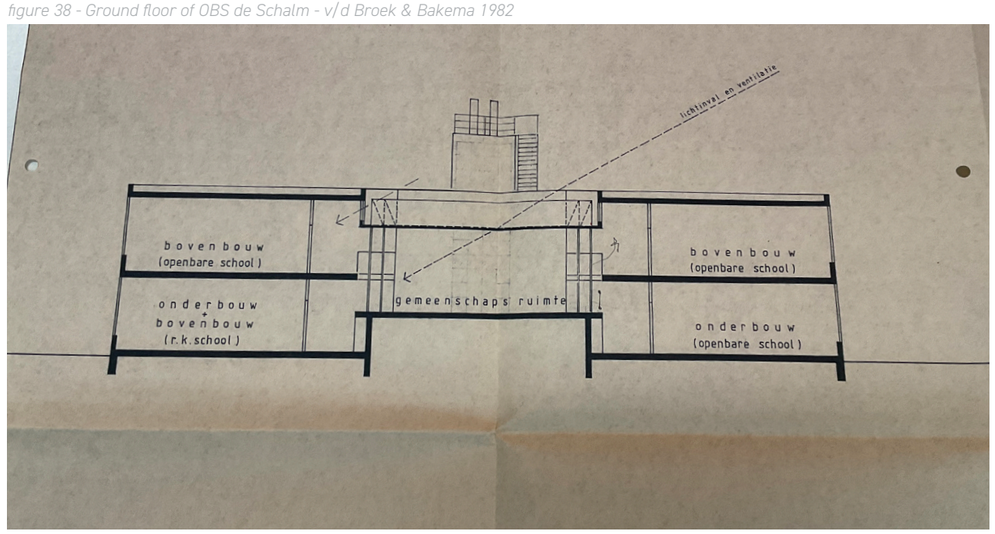


figure 39 - Section of OBS de Schalm - v/d Broek & Bakema 1982

6. Conclusion

'Active engagement helps create a positive classroom environment and establish a community of learners who support each other.' Social interaction in education, based on this quote, is a great measure for improving the quality of education. Besides this, it also helps students develop the essential skills of communicating and working together. This is what led to the main research question: *What are the ideas of the architect of 't Ronde, Apolloschools, and De Schalm on meeting in the schools and how do the school buildings evoke social interaction?* The school buildings mentioned in the question designed by respectively: Jan Verhoeven, Herman Hertzberger and Van den Broek and Bakema are all designed in a timeframe of 3 years around the year 1980.

Educational and architectural background

During this period, education had moved away from the classical style of educating in the form of only bringing knowledge to incorporating the building of character which was seen just as important as the learning itself. The view on education had made a switch to a more social approach, intending to try and create a feeling of togetherness by stimulating social interaction amongst the students. School buildings were seen as a complete society, reflecting the current way of thought during that time in the larger society of the Netherlands.

This same approach to socialism and the view on society was changing in the architectural way of thinking and resulted in new movements that emerged during and in advance of the period the school buildings were designed. Criticism on the modernist and functionalist way of thinking of the CIAM (Congrès Internationaux d'Architecture Moderne) increased and led to the rise of the forumgroup and team X. The groups were moving against the strict separation of functions and pledged for a more diverse and mixed palette in the form of a materialized form of relations. The focus shifted to a new way of architecture in which individual and social qualities were developed. This way of architecture later evolved into what we nowadays call structuralism, which can be divided into six common design principles, of which two can be used effectively during the comparison of the three school buildings, naming: the design from the point of encounter and the interconnectivity of unities.

Comparing the architects' philosophies on architecture

All three architects are linked to structuralism in some way, and incorporate design principles and socialistic ideas in their design philosophies. The architect of 't Ronde, Jan Verhoeven, for instance, states that he tries to make little communities out of the children, which has according to him *'everything to do with the relationships we have amongst each other.'* He urges to inspire the students in his school buildings by stimulating the students through his architecture and letting them be fascinated by them. Herman Hertzberger, the architect of the Apolloschools, takes a step back, stating that *'people feel at home in his buildings'* and that his buildings always serve the people that are using them. Just like Jan Verhoeven, Hertzberger also sees his school buildings as little cities, with the public and private realms just as in the outside world. The architects firm of Van den Broek and Bakema joins Hertzberger by mentioning that people should feel at home in their designs, although they keep it to a more abstract level often relating smaller spaces to the larger scale of a city.

All architects have despite minor differences a similar approach to architecture in the way they think about the people that will inhabit or use the spaces they designed. With the statements that people should feel at home in their buildings all of the architects clearly design based on a human experience often relating their spaces to the human scale, which is often mentioned by all three architects.

Comparing the school buildings

When looking at the central heart of the three school buildings there are a lot of similarities in the approach the architects take to evoke social interaction amongst the children. The most obvious way is by the usage of varying heights around the central space, which is executed in different ways in every school building. Jan Verhoeven and Van den Broek and Bakema make use of balconies in different configurations, Verhoevens balconies semi-encircle the central space, being accessed by five multifunctional staircases and v/d Broek and Bakema use balconies that run parallel to the central space with access elsewhere in the building. Hertzberger approaches this differently by encircling the central space entirely with the usage of a split-level configuration, resulting in many overlooking spaces on varying heights, creating a dynamic environment. These balconies or viewing platforms all come from the same concept of the amphitheater, of which the building of Verhoeven is the most successful, because of its shape that points all viewers towards the central area of the building. Another important space inside of the central heart is the way the height difference is accessed. All three projects incorporate bleacher stairs, that offer a place for students to work or to look at a theater play or a week closure. All of the stairs are modestly in size, of which the building of Hertzberger has the biggest surface area.

Finally, all architects use the little remaining corners in their buildings to incorporate elements for the children to sit or work at. Verhoeven has for instance his dormers and tables in and around the balconies. Hertzberger integrated porch-like spaces that feel cozy and more friendly to the children and the library on the top floor with the lower ceiling height, creating again a protected area to concentrate. V/d Broek and Bakema are more modest with their spaces, being the slanted areas along the raised communal area.

Conclusion and final thoughts

All architects succeeded in creating a central heart that evokes social interaction to varying extents, the schools of Hertzberger and Verhoeven look like they achieved this goal in a better way than the OBS de Schalm, which looks a lot more technical and sober. This most probably has to do with the organization of the school, being a more traditional primary school compared to the two Montessorischools, which focus on shaping the children through social interaction and self-education. Hence why the two schools of Hertzberger and Verhoeven have many places for the children to work on projects, while the building of v/d Broek and Bakema does not have any.

It can therefore be concluded that architecture is greatly influenced by the philosophy of the organization that commissions the architect for the design of a school building. Despite the architect incorporating bits of his ideology in the project, the buildings should and will always reflect the requirements set by the client. The way these requirements affect the design process and the choices the architect makes based on these in comparison to his ideology can be a lead for further research on these three school buildings, but also many more buildings spread over many generations. The tension that arises in the middle of the requirements and the philosophy of the architect can then be the main topic of research, looking at which side has to compromise the most to end up with a working building both parties are happy.

Closing with A statement introduced in the chapter on education 'Life is an ever-evolving process, over time new ideas are born and offer new insights that lead to new possibilities and approaches to handle familiar problems or processes differently.' This is also the case with architecture, of which these three schools, structuralism, and all the other movements offer many insights for future generations to learn from, improving our current systems each time incrementally.

figure 40 - Central heart, 't Ronde - Verhoeven 1979

figure 41 - Overview of the central heart Montessoirschool - Hertzberger 1980

figure 42 - Interior of OBS de Schalm - v/d Broek & Bakema 1982

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Delft University of Technology

Jasper Sterrenburg - 5653673