DESIGNING DEAF SCHOOLS

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PREFACE

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Without all of you, this research could never have been done.

PREFACE

You are reading the research report of Julia Coolen's graduation into the design of deaf schools. This book consists of a pattern language that has been drawn up on the basis of research. An explanation of what a pattern language entails follows further on in the book. This is preceded by an introduction to the subject of deaf schools and the problems experienced by the deaf and hard-of-hearing in the built environment.

It should be mentioned that the patterns that have been drawn up in this book are not finished. These patterns were drawn up during the research part of the graduation by means of fieldwork and literature. When the second part of the graduation starts, the design, this will have influence on the patterns. It is only during the designing that the patterns mentioned in this book can be tested. It may be that patterns have to be adjusted, that patterns are removed or that new patterns are added. After the design process, there will therefore most likely be a new version of this book. In this version it will be clearly mentioned whether a pattern comes from research, design or that a pattern has been adjusted.

Finally, it is important to note that this research was done by a hearing person. I am aware that it is a sensitive issue to do research on the deaf community as a hearing person. I have therefore done my utmost best to keep a low profile. This research has not been drawn up lightly and has not been devised by me alone. The problems I describe are reality and I serve only as someone who is listing the problems that the deaf and hard-of-hearing experience in education. All information in this research comes from the deaf and hard-of-hearing and not from me. This research is not about me, but about the deaf community. My end goal, even if it is only a little, is to help make the built environment and specifically in my research, a school, a better and more pleasant place for the deaf and hard-of-hearing.

INTRO

BACKGROUND

A total of 1.5 million people in the Netherlands are deaf or hard-of-hearing (Kentalis, 2021). That is a percentage of 8.6%. But it has to be mentioned that the majority of this group becomes deaf or hard-of-hearing later in life. If we look more specifically at the distribution among children in the Netherlands, 1 in 1000 people are born deaf, and 1 in 1000 people become deaf later in childhood (Smeijers, 2019).

HISTORY OF THE DEAF AND HARD-OF-HEARING

The history of the deaf and hard-of-hearing in the Netherlands is virtually unknown among hearing people. This is partly due to the fact that many sources about the history of the deaf and hard-of-hearing are fragmented and scattered throughout the country. A large part of the information has even disappeared, because in the past the information was not or carelessly stored (Dovenschap, 2015a). Only at the end of 2021, an initiative to store documents and information about the history of the deaf was started. A first step has been taken to make an inventory of tangible and intangible things of historical and cultural value to the Dutch deaf community (Dovenschap, 2015b).

For centuries, the deaf have been seen as second-class people (De geschiedenis van gebarentaal, 2020). Many people who were born deaf have difficulty speaking because they cannot hear sounds and therefore cannot reproduce them. Deafness was therefore seen as a lack of intelligence, or as a divine punishment. As a result, many deaf people fell out of society. They therefore founded their own communities during the Middle Ages, in which the deaf developed their own way of communication with hand signs and lip reading, also known as the first forms of sign language (De geschiedenis van gebarentaal, 2020). However, this was not yet a real language in its own right, and the first steps towards such a language were not taken until the eighteenth century, during the Enlightenment. The need came to teach the deaf to communicate (De geschiedenis van gebarentaal, 2020). Monk Charles-Michel de L'Épée founded the first real school for the deaf in Paris. Around the same time, in 1778, Samuel Heinecke also founded a school for the deaf in Leipzig (Schermer, 2016). However, the two schools had a big difference in teaching methods. In Paris, teaching was based on sign language, while in Leipzig it was based on lip reading. Despite this difference, the goal remained the same: to teach the deaf to communicate. As a result, more schools appeared in Europe. The Netherlands also followed suit: in 1790, Henri Daniel Guyot founded the first Dutch school for the deaf in Groningen (Schermer, 2016). However, a discussion

arose about which method of teaching was better: sign language or lip reading? More than a century later, the discussion 'came to an end'. Scientists gathered to decide on the method of teaching. The first conference in Paris ended in a row, but at the second conference in Milan in 1880, the decision was taken. Lip reading was decided on as the best teaching method. As a result, sign language education was banned throughout Europe. It was not until 1980 that this ban was lifted (De geschiedenis van gebarentaal, 2020). If we specifically look at the Netherlands, we can see that deaf people continued to use sign language among themselves during the ban. The result was the alienation of the deaf within the hearing world. Something that is still noticeable today. This continuation of sign language led to the creation of five 'sign language dialects' in the variously established deaf schools in the regions of Groningen (1790), Sint-Michielsgestel (1840), Rotterdam (1853), Voorburg (1888) and Amsterdam (1911) (Pyfers, 2020). After 1980, the use of sign language slowly returned to the Netherlands and to education. In 1995, Henri Daniel Guyot's school for the deaf in Groningen became the first to teach in sign language. Schools in the rest of the country soon followed (Schermer, 2016). The issue however, became that there were five different 'sign language dialects' in the Netherlands. On the basis of an extensive inventory of all five dialects, from 1999 to 2002 the standardisation of Dutch Sign Language was introduced (Schermer, 2016). This marked the creation of Dutch Sign Language (NGT, Nederlandse Gebarentaal), but the language was not recognised as an official language until the 1st of July 2021 (Ministerie van Algemene Zaken, 2021). This was the result of years of lobbying and, as a final push, the presence of Irma Sluis and other sign language interpreters at the Covid-19 conferences. With the legal recognition of NGT as a language, the government is obliged to encourage NGT in society. This means that in crisis and emergency situations, messages are now translated into NGT by default, someone who speaks using NGT can now use it during a court case, signers may take an oath, promise or affirmation in NGT and speeches by, for example, members of the cabinet are translated into NGT by default (Ministerie van Algemene Zaken, 2021).

PROBLEM STATEMENT

When we experience a space, we experience it through our senses (Marinova, 2019). Sounds, smells and textures can strongly affect our experience of a space, making architecture sensory. We use the information form our eyes, ears, nose and skin to understand a space and what is occurring there (Blesser & Salter, 2009). But what happens when one of your senses is absent or impaired? What happens if you are deaf?

SENSE OF (NOT) HEARING

Our sense of hearing has a big impact on our experience of a space or situation. Sounds connect us to each other: the sounds of footsteps on a floor lets us know that someone is approaching, hearing someone whistling signals comfort, raised voices in a heated discussion indicates conflict and the sound of sirens warn us for danger. From a biological and evolutionary perspective, our sense of hearing enabled our ancestors to locate prey and predators, making hearing an important prerequisite for survival (Blesser & Salter, 2009). Another function of sound is to give signals to help us move through a space. This is similar to how the blind move through a space. Blind people can 'see' by listening carefully. The tapping of their white canes and the change in frequencies helps them orientate and navigate, also known as echolocation (Toegankelijkestad, n.d.). Without these auditory signals, we are less able to navigate: imagine walking through a room with headphones blaring loud music, we become less confident as we have become functionally deaf to auditory signals that we unconsciously use to navigate (Blesser & Salter, 2009).

Deaf and hard-of-hearing people do not have these auditory signals. They can not hear people approaching or use sounds to help them navigate. Their sense of hearing is absent or impaired. When a sense is absent or impaired, changes in the brain improve the use of the senses that are present (Napoli, 2014, p.211). Deaf and hard-of-hearing people compensate for their hearing loss through extraordinary sensory *"super powers"* (Holmes, 2017, p.181). One of these *"super powers"* of the deaf and hard-of-hearing is heightened visual sense. In his research Renard (2004) describes this as follows: *"The deafness is not the world of silence, but that of the vision. It is through the vision that deaf people compensate deafness"*. Padden and Humphries talk about the same concept in their research on deaf culture but added more to it (2006, p.2): *"Deaf people's practices of 'seeing' are not necessarily natural or logical, in the sense that they have a heightened visual sense, but their ways of 'seeing' follow from a long history of interacting with the world*

in certain ways––in cultural ways." Think about the schools they attended, the communities they got involved with, their jobs and the language they created to communicate (Padden & Humphries, 2006, p.2). Deaf and hard-of-hearing people have learned to 'see' sound through visual cues. Bahan uses the following example in his essay (2014, p.241): *"Say a deaf person is walking somewhere and he notices several people looking in the same direction. He will know something is happening and will look also to see what the commotion is about."* Understanding situations like these and seeing sound comes with a great deal of practice. Constantly being aware of your surroundings is based on a visual way of being, and deaf and hard-of-hearing people can often identify in a crowded room which of them are deaf or hard-of-hearing just by noticing how they use their eyes (Bahan, 2014, p.241). Additionally the deaf and hard-of-hearing have heightened tactile senses (Napoli, 2014, p.222). They can 'hear' sound by feeling vibrations. Bahan describes this feeling of vibrations by 'tactile parties' (2014, p.245). He illustrates a rock festival for the deaf and hard-of-hearing with extremely loud music in an enclosed space, where sound bounces off the walls like echoes. The music can be felt in your body (Bahan, 2014, p.245). But the sense of touch not only focusses on vibrations: deaf and hard-of-hearing people use touch to attract each other's attention and to express emotions (Napoli, 2014, p.223). They tap another's shoulders to get their attention or use touch during a signed conversation to signal someone's intention to speak next (Holmes, 2017, p.188).

The deaf and hard-of-hearing have long been aware that their perception of the world is unique, experiences that may not be explained scientifically (Holmes, 2017, p.181). But this different perception and different way of approaching the world can also lead to anxiety. For example some deaf and hard-of-hearing people have a lot of worry in their daily lives: What if I don't hear something important? What if I misunderstand someone and embarrass myself? What if my hearing aid batteries run out (Ehrenfeld, 2021)? Problems that can have a lot impact on someone's confidence or self-esteem. Or if we look back at how our ancestors used sound to locate prey and predators, the inability to do so can lead to anxiety (Blesser & Salter, 2009). And if you cannot hear sirens, you cannot be warned. It can give deaf and hard-of-hearing people the feeling of being unsafe (99% Invisible, 2020). These feelings of anxiety and being unsafe also occur in the built environment. As stated in Coolen's research (2021) the deaf and hard-of-hearing live in world that, from an architectural standpoint, is designed for hearing people. Which causes a set of challenges for the deaf and hard-of-hearing: uneven pavements, unexpected steps - both of which can cause a person to fall when they are concentrating on a signing conversation-, narrow hallways, poor lighting and glares - both of which can make readings someone's face and lips more difficult-, to name only a few of these challenges (Hales, 2017). Furthermore spaces designed for the hearing, can give the deaf anxiety – when you cannot hear footsteps from around the

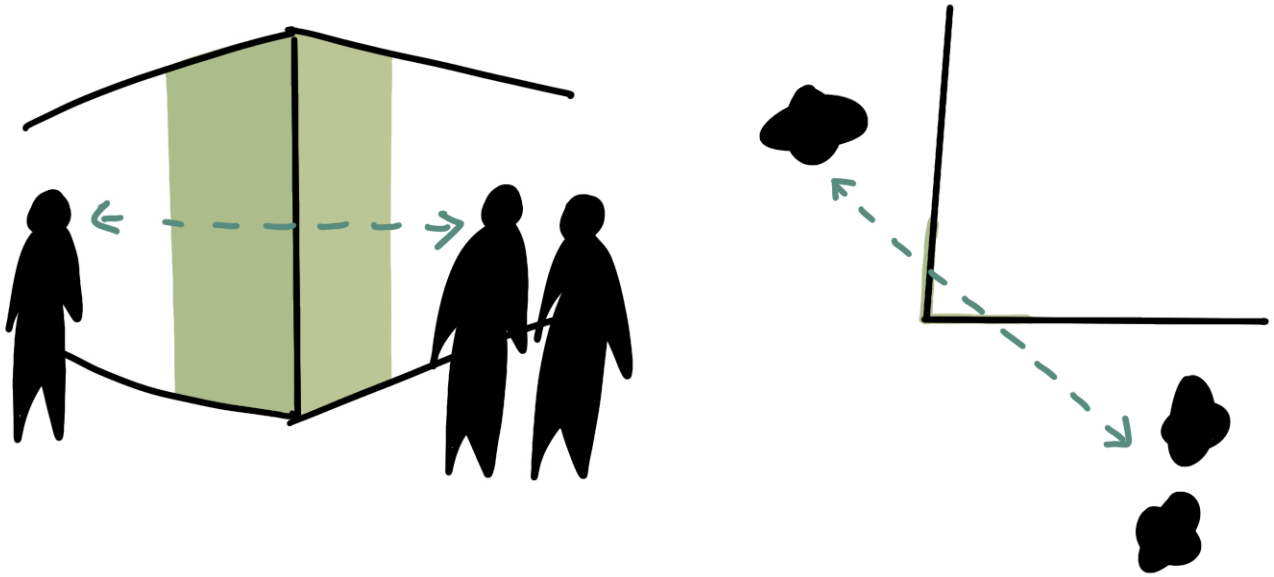


Figure 1. Julia Coolen. (2022). Mobility and Proximity. [Illustration]. Based on http://inclusion.vn/deaf/deaf-space/

corner or behind you, you cannot prepare for who or what is around you (99% Invisible, 2020). For example, when walking together in conversation deaf people tend to keep a wide distance from another for clear visual communication using sign language. During a conversation signers will also shift their gaze between the conversation and their surroundings keeping a close eye for hazards and maintaining proper direction (Bauman, 2005). A corner wall, as seen on figure 1, will keep a person approaching out of view, meaning that the signers will have to stop their conversation once they reach the corner to avoid bumping into each other. Where hearing people can adjust their walking route by being alerted by the sound of footsteps, deaf people are not able to (Coolen, 2021).

DEAFSPACE

The previous paragraph described one of the five design principles of DeafSpace (*Mobility and Proximity*). DeafSpace is about creating awareness and it seeks to design and improve spaces to be functional for the deaf and hard-of-hearing. One place where the challenges from the built environment were particularly prevalent was Gallaudet University in Washington, a university for the deaf and hard-of-hearing. In 2005 the university assigned architect Hansel Bauman to make a design for their new and improved campus. To make this design Bauman, who is not deaf, collaborated with the ASL (American Sign Language) Deaf Studies Department for over three years to create the architectural approach known as DeafSpace (Gallaudet University, n.d.). Together they developed a framework of more than 150 design elements that impacts how the deaf and hard-of-hearing experience a space. These elements aim to address not only the practical needs of communication, but also the need we all have to feel safe and secure in our surroundings. The 150 elements can be placed in what has become the five principles of DeafSpace (Gallaudet University, n.d.): *Mobility and Proximity, Space and Proximity, Sensory Reach, Light and Colour,* and *Acoustics* (Coolen, 2021).

As of now two buildings on Gallaudet's campus are using these principles of DeafSpace. One of these buildings is the main building of the campus: the *Sorenson Language and Communication Center*, or *SLCC*, by SmithGroup, with deaf architect George Balsley serving as a consultant. The other is the *Living and Learning Residence Hall 6* of Gallaudet University, or *LLRH 6*, by LTL Architects in collaboration with Quinn Evans Architects. At present these buildings of Gallaudet University are the first and only full-fledged projects based on DeafSpace design.

DUTCH DEAF SCHOOLS

The focus of this research is not on everyday buildings, such as a train station, cinema or shopping centre,

Figure 2. Julia Coolen. (2022). Deaf and hard-of-hearing schools in the Netherlands sorted by organisation [Illustration].

but specifically on one target group: schools for the deaf and hard-of-hearing. The many problems deaf and hard-of-hearing face in life and the built environment also have major effects at schools for the deaf and hard-of-hearing. These schools are mainly located in buildings that happened to be empty or that already had an educational function anyway. These buildings have never been specifically designed for the deaf and hard-of-hearing, which causes a problem. If a school for deaf and hard-of-hearing pupils was never designed for them, how can these buildings reflect and be good for them?

Learning originates from the perception and concentration of pupils in classrooms (Sanoff, 2004). But, as established, the deaf and hard-of-hearing have a different perception, which leads to a different way of learning. Deaf and hard-of-hearing pupils are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. The difference between the cognitive development of deaf and hard-of-hearing and hearing pupils is in the way this knowledge is conveyed through language (Gaudiot & Martins, 2018). The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision. It is with the eyes that the deaf and hard-of-hearing can 'hear'. Meaning that it is also with the eyes that the deaf and hard-of-hearing learn.

Deaf and hard-of-hearing children in the Netherlands can attend a special school for the deaf and hard-of-hearing, also called cluster-2 schools (Doof.nl, 2018). This can be either primary or secondary education. There are four types of school organisations in the Netherlands that offer education for the deaf and hard-of-hearing: Royal Kentalis, The Royal Auris Group, VitusZuid and VierTaal. Of these four, Kentalis is the largest in the Netherlands. Figure 2 shows an overview of the locations of these schools, both primary or secondary. They are marked per school organisation. The K stands for Kentalis, A for Auris and VZ for VitusZuid and VT for VierTaal.

What is immediately apparent is the unequal distribution of schools throughout the country. On the Wadden islands, there is not a single school for the deaf and hard-of-hearing, and in the provinces of Zeeland, Gelderland, Flevoland, Overijssel, Drenthe, Groningen, Friesland and Limburg schools for the deaf and hard-of-hearing are only found in the larger cities. Meaning that if you do not live in one of these areas with schools, you have to travel a long way to attend a deaf or hard-of-hearing school. Furthermore, each school organisation has its own educational method and approach, and given the freedom of choice of parents, it is therefore also possible that one school will be better suited for a child than another. For this reason, it is possible that the closest school is not the most suitable school. As a result, travel times may be even longer.

RESEARCH QUESTIONS

The built environment has to change and be more inclusive. Deaf and hard-of-hearing pupils are visual individuals and the design of a school for the deaf and hard-of-hearing should be based on that aspect. Within this research it will be studied how to make this change happen, and how to design a deaf school, by means of the following question: *How to design an appropriate school for the deaf and hard-of-hearing?*

SUB QUESTIONS

To help answering the main question the following sub questions will be resolved:

1. *What are the problems deaf and hard-of-hearing people can encounter in daily live?*
2. *What are ingredients for a PvE that can be abstracted from good and bad examples of schools for the deaf and hard-of-hearing?*
3. *How to translate social and behaviour requirements into design guidelines?*

METHOD

To answer all the research questions different methods will be used. For the first two sub questions, *What are the problems deaf and hard-of-hearing people can encounter in daily live?* and *What are ingredients for a PvE that can be abstracted from good and bad examples of schools for the deaf and hard-of-hearing?,* fieldwork will be done at Dutch schools for the deaf and hard-of-hearing by means of observations, interviews and mapping. Interviews will be held with both pupils, teacher and deaf and hard-of-hearing people not associated with schools. During the observations, a classroom, multiple hallways, the auditorium, outdoor areas and in some cases the library are examined on as to how the pupils and teachers use these spaces. Next to this a literature study on the deaf community and Gallaudet University and its principles of DeafSpace will take place. This will all lead to the method for the third sub question, *How to translate social and behaviour requirements into design guidelines?*, a pattern language. The elements of this language are units called patterns. Each pattern describes, by means of text and pictures, a problem that occurs in deaf schools and/or in the deaf community. The solution to that problem is then outlined.

THEORETICAL FRAMEWORK

No typical experience of being deaf exists, and deaf people do not form one unified social group. Every deaf person and also every hard-of-hearing person relates to their hearing loss in a different way (Holmes, 2017,p.175). How people 'label' or identify themselves is personal and may reflect someone's identification with the deaf and hard-of-hearing community, the extent to which they can hear, or the relative age at which they became deaf or hard-of-hearing (National Association of the Deaf - NAD, n.d.). Therefore, when talking about deafness in research and in life, many terms are being used: *deaf, Deaf, hard-of-hearing, late-deafened* and *people with hearing loss*, to name only a few. There is however, a difference between these terms. The term *deaf* is used to describe the condition of deafness and by some people the condition of being hard-of-hearing. The term *Deaf*, with a capital D, describes people that are part of the deaf community. It describes the cultural practises (Padden & Humphries, 2006, p.10). The term *hard-of-hearing* is used to describe people with a partial hearing loss. *Late-deafened* is sometimes used by people who later in life became deaf. Other people use the term *people with hearing loss* to describe people who are somewhere in the spectrum from being deaf to having a slight hearing loss, thinking this is inclusive and efficient (National Association of the Deaf - NAD, n.d.).

In this research the terms *deaf* and *hard-of-hearing* are used. This choice was made for the reason that deafness and hard-of-hearing are two different things: one does not describe the other. The term *Deaf*, with a capital D, is not used, because in this research no assumptions are made as to whether or not someone is part of the deaf community or feels connected to it.

EXISTING RESEARCH AND LITERATURE

Existing research and literature on being deaf and hard-of-hearing mainly focusses on deaf culture, including research by Stebnicki and Coeling (1999) and Humphries and Padden (2006) and literature by Ladd (2003), and what it means to be deaf or hard-of-hearing, such as research by Bauman and Murray (2014) and Holmes (2017). Some research has been done on how to create better spaces for the deaf and hard-of-hearing, such as research by Hope (2017), however this research does not specifically talk about designing schools for the deaf and hard-of-hearing. More specific research on schools for the deaf and hard-of-hearing talk about the needs, abilities or social problems deaf and hard-of-hearing children face, including literature

by Ramsey (1997) and research by Shaver et al. (2013), van Eldink et al. (2014) and Alramamneh et al. (2020), or examine the methods in which deaf and hard-of-hearing pupils should be taught, such as research by Cawthon (2004) and Gaudiot and Martins (2018).

Findings from these studies and literature will be used in this ongoing research. Information about deaf culture and what being deaf or hard-of-hearing means from research and literature by Stebnicki and Coeling (1999), Ladd (2003) and Humphries and Padden (2006) and Bauman and Murray (2014) and Holmes (2017), will help in the interviews and observations with and of deaf and hard-of-hearing people during the fieldwork. Hope's research (2017) on how more general spaces can be designed for the deaf and hard-of-hearing will help to form good design proposals for schools for the deaf and hard-of-hearing. The research and literature of Ramsey (1997), Shaver et al. (2013), van Eldink et al. (2014) and Alramamneh et al. (2020) on the needs, abilities and social problems deaf and hard-of-hearing children face, will not only help with the interviews and observations, but also help answering the research questions. Finally, the information on the methods in which deaf and hard-of-hearing pupils should be taught, from Cawthon (2004) and Gaudiot and Martins (2018), will also be useful in formulating the design proposals.

DEAFSPACE

In addition to all the research mentioned above, it is also important to look at DeafSpace. A lot of research has been done on this subject, such as Bauman (2005), Tsymbal (2010), Johnson (2010), Edwards and Harold (2014) and Harahap et al. (2020). DeafSpace uses its principles to guide the design of spaces for the deaf and hard-of-hearing, which is very valuable for this research. Furthermore, the buildings that exist today and use DeafSpace and its principles, the previously mentioned *Sorenson Language and Communication Centre, or SLCC,* and the *Living and Learning Residence Hall 6,* or *LLRH 6*, also provide much information for this research. What is particularly interesting are the findings and also problems that were discovered after these buildings were completed and during their use. These findings and problems will help in the formulation of the pattern language and may become part of it. Lastly, the principles of DeafSpace more focused on education will also be of great value for this research. They can help to create good design proposals for schools for the deaf and hard-of-hearing.

EXPECTED RESULTS

As stated, the findings of this research will be translated into a pattern language. These patterns form guidelines on how to design a school for the deaf and hard-of-hearing. These guidelines can be applied in the design, but can also be expanded while designing and testing through design. Some will be specific for a high school for the deaf and hard-of-hearing, others more general for schools for the deaf and hard-of-hearing or even general for reducing stress or increasing communication and perception by deaf people in architecture.

DESIGN

The guidelines will function as a hand book and inspiration for the design process of a high school for the deaf and hard-of-hearing, located in the Netherlands.

LOCATION

Based on the research on the location of existing schools for the deaf and hard-of-hearing multiple possible locations have been chosen for the design (figure 3). These locations are in places where there are few or no schools for the deaf and hard-of-hearing. On the Wadden islands, there is not a single school for the deaf and hard-of-hearing, and in the provinces of Zeeland, Gelderland, Flevoland, Overijssel, Drenthe, Groningen, Friesland and Limburg schools for the deaf and hard-of-hearing are scarcely found.

As a next step, several possible cities have been chosen within these locations. Due to better accessibility, the larger cities within the locations were chosen. This is based on the fact that there is a shortage of schools for the deaf and hard-of-hearing, which results in a very large radius from which children come to school. This in turn leads to long travel times to school. An easily accessible city is therefore important. The following cities have been researched for a suitable and inspirational location: in Gelderland, *Apeldoorn* en *Deventer*, in Flevoland, *Lelystad*, *Almere* and *Emmeloord*, in Friesland, *Leeuwarden*, *Drachten* and *Heerenveen*, and in Limburg, *Venlo*, *Roermond* and *Maastricht*.

Figure 3. Julia Coolen. (2022). Possible locations deaf and hard-of-hearing school [Illustration].

FIELDWORK

Figure 4. Julia Coolen. (2022). Visited deaf schools [Illustration].

FIELDWORK

As explained, fieldwork has been conducted as research. This fieldwork was conducted in the form of school visits during which observations and interviews were done. A total of six schools in the Netherlands have been visited, as shown in figure 4:

- Auris Dr. M. Polanoschool, Rotterdam
- Kentalis College Zoetermeer, Zoetermeer
- Kentalis Guyot VSO, Haren
- Kentalis Guyot SO, Haren
- Kentalis Guyot VSO Vries, Vries
- Kentalis Compas College, Sint-Michielsgestel

In addition to the school visits, an interview was held with a hard-of-hearing student from Delft University of Technology and contact has been established with the architect, Avesaa Anton Vermeulen Architects, of the new building of the Kentalis Compas College. An overview of the interview questions and an overview of all interviewed persons can be found in Appendix I and II.

SCHOOL VISITS

The first school visited was the Dr. M Polano primary school in Rotterdam of the Auris school organisation. Here, an interview and a tour with the director took place. After that, a visit took place to the Kentalis College Zoetermeer, a secondary school with practical education. Here, a tour and an interview with the PE teacher/team leader, interviews with five pupils and one teacher took place. Next, a visit was made to three schools and a boarding house in Haren and Vries, Groningen: Kentalis Guyot VSO, SO, VSO Vries and Het Verblijf. First of all, a visit was paid to the VSO. There are four educational directions at this school: day care, work, vmbo and havo. During the visit, a tour took place, interviews were held with the director, a pupil and a teacher, and observations were made. Observations were made of the auditorium during the breaks and a free period, a gym class, a maths lesson and the end of the school day when pupils are picked up by taxis. After this, a visit was made to the boarding house of the VSO, called Het Verblijf. Some pupils live here during the week, since they live too far away to travel back and forth every day. Two interviews were conducted here with the supervisors of one of the houses. Next, Kentalis Guyot SO, the primary school


good lighting
natural light
curtains
glare
floor colour contrast with

on the same site as the VSO, was visited. A tour and interview with the concierge took place, a pupil was interviewed and observations were made. Observed were a lesson of group 5/7 DSH, *doof en slechthorend education*, a lesson of group 5/7 CMB, *communiatief meervoudig beperkt*, a short joint lesson in the auditorium and the two schoolyards for the smaller and bigger pupils. Then a visit was paid to Kentalis Guyot VSO Vries, a secondary school for CMB pupils. In addition to a language development disorder or hearing loss, these pupils also have developmental delays or mental or physical disabilities. A tour of the school, three interviews with teachers and observations took place. Observed were a lesson and one of the two daily walks of one of the groups. The last school visit was to the Kentalis Compas College in Sint-Michielsgestel, a secondary school with two directions: practical education and (sheltered) work. It is important to mention that this school will move to a temporary building after the summer until their new school in Zaltbommel, specially designed for them, will be finished. During the school visit, there was a tour and interview with the concierge, one teacher and three pupils were interviewed, and observations were made. Observed were a psycho-education lesson, a math lesson, a mentor lesson and the auditorium during the breaks.

RESULTS

In the end, the schools provided me with a lot of data. From each school visit, I have the interviews, notes from observations, many photos with analyses (as can be seen on the left) and analysed floor plans. The pattern language was developed on the basis of the data from these school visits. The results of these school visits can therefore be found in the pattern language that follows.

PATTERN LANGUAGE

PATTERN LANGUAGE

As stated, the findings of the school visits, interviews and observations have been translated into a pattern language. The elements of this language are units called patterns. Each pattern describes, by means of text and pictures, a problem that occurs in deaf schools and/or in the deaf community. The solution to that problem is then outlined (Alexander, 1977; 1980; 1985). These patterns form guidelines on how to design a deaf school. These guidelines can be applied in the design, but can also be expanded while designing and testing through design. Some will be specific for a high school for the deaf and hard-of-hearing, others more general for deaf schools or even general for reducing stress or increasing communication and perception by deaf people in architecture. The guidelines will function as a hand book and inspiration for the design process of a high school for the deaf and hard-of-hearing, located in the Netherlands.

STRUCTURE OF PATTERNS

The patterns each consist of a number, a statement and a further explanation or clarification of that statement, followed by a solution. Each pattern is further supported by means of an image. These images were taken during the visits to the six different schools. Furthermore, for each pattern is noted to which other patterns it relates. The complexity of the pattern language becomes apparent from the amount of related patterns. This complexity becomes fully apparent at the end of the pattern language when all patterns are translated into two graph, one indicating the level of abstraction and scale and one indicating the different relations. Next to this the used sources for a pattern are mentioned. For example, reference is made to when and which literature was used to create a pattern and when a pattern emerged from fieldwork. In the cases where a pattern emerged from fieldwork, it is mentioned whether this came from an interview or observation as well as from which school. Additionally, each pattern is classified with different icons. These icons indicate what each pattern is about, for example a pattern can be about distractions, classrooms and/or about acoustics. An overview of these icons follows next. Lastly, to create order in the patterns, all 71 patterns have been placed in 10 categories:

- acoustics
- advice
- furniture
- kiss & ride
- lighting
- location
- sight lines & overview
- spaces
- visual school
- walking route

ICONS

ACCESSIBILITY
Pattern relates to accessibility and is about giving everyone the opportunity to use all forms of facilities and architecture.

ACOUSTICS
Pattern relates to acoustics and is concerned with sound and the properties that a space has on the sound and reverberation.

AUDITORIUM
Pattern relates to the auditorium and it deals with its use, characteristics and architecture.

CIRCULATION
Pattern relates to circulation and deals with passageways, their use, characteristics and architecture.

CLASSROOM
Pattern relates to classrooms and it deals with its use, characteristics and architecture.

COLOUR & MATERIAL
Pattern relates to colours and materials and is concerned with construction, properties and use.

DISTRACTION
Pattern relates to distraction and is concerned with an events or activities that focus the mind on something else.

ENTRANCE
Pattern relates to entrances and it deals with its use, characteristics and architecture.

EXTRA FUNCTION
Pattern relates to extra functions. This refers to functions that are not necessarily present in hearing education.

FURNITURE
Pattern relates to furniture and it deals with its use and characteristics.

GYMNASIUM
Pattern relates to the gymnasium and it deals with its use, characteristics and architecture.

LIGHT
Pattern relates to light and is concerned with its properties and use.

LOCATION
Pattern relates to location. This refers to the requirements surrounding the location of a deaf school.

OUTDOOR
Pattern relates to the outdoors. This refers to the requirements surrounding the adjoining outdoor space of a deaf school.

OVERVIEW
Pattern relates to overview and has to do with oversight of spaces. This relates to the heightened visual sense of the deaf and hard-of-hearing.

SCHOOL
Pattern relates to the entire school and it deals with its use, characteristics and architecture.

SIGHT LINES
Pattern relates to sight lines and has to do with oversight of spaces. This relates to the heightened visual sense of the deaf and hard-of-hearing.

STORAGE
Pattern relates to storage and it deals with its use, characteristics and architecture.

THEORETICAL
Pattern relates to theory. This refers to the fact that within a pattern, theory from literature is discussed.

USE OF SPACE
Pattern relates to the way people use spaces and it deals with characteristics, architecture and the how.

DEAFSPACE

Pattern relates to DeafSpace and its five principles: *Mobility and Proximity, Space and Proximity, Sensory Reach, Light and Colour,* and *Acoustics*.

As has been discussed, the built environment has mostly been designed from an able-bodied perspective, which causes a set of challenges for deaf and hard-of-hearing people: uneven pavements, narrow hallways, unexpected steps, poor lighting, backlight, glares and wall colours that blend with skin tones, to name only a few of these challenges (Hales, 2017). DeafSpace is about creating awareness and it seeks to design and improve spaces to be functional for the deaf and hard-of-hearing. One place where the challenges from the built environment were particularly prevalent was Gallaudet University in Washington, a university for the deaf and hard-of-hearing. In 2005 the university assigned architect Hansel Bauman to make a design for their new and improved campus. To make this design Bauman, who is not deaf, collaborated with the ASL (American Sign Language) Deaf Studies Department for over three years to create the architectural approach known as DeafSpace (Gallaudet University, n.d.). Together they developed a framework of more than 150 design elements that impacts how the deaf and hard-of-hearing experience a space. These elements aim to address not only the practical needs of communication, but also the need we all have to feel safe and secure in our surroundings. The 150 elements can be placed in what has become the five principles of DeafSpace (Gallaudet University, n.d.): *Mobility and Proximity, Space and Proximity, Sensory Reach, Light and Colour,* and *Acoustics*.

As of now two buildings on Gallaudet's campus are using these principles of DeafSpace. One of these buildings is the main building of the campus: the Sorenson Language and Communication Center, or SLCC, by SmithGroup, with deaf architect George Balsley serving as a consultant. The other is the Living and Learning Residence Hall 6 of Gallaudet University, or LLRH 6, by LTL Architects in collaboration with Quinn Evans Architects. At present these buildings of Gallaudet University are the first and only full-fledged projects based on DeafSpace design. An analysis of the SLCC and LLRH 6 and the principles of DeafSpace can be found in Appendix III.

MOBILITY & PROXIMITY

When walking together in conversation deaf people tend to keep a wide distance from another for clear visual communication using sign language. During a conversation signers will also shift their gaze between the conversation and their surroundings keeping a close eye for hazards and maintaining proper direction (Bauman, 2005).

SPACE & PROXIMITY

When deaf people sign they tend to keep a wide distance from another to better see each other's facial expression and to give space for signing. This distance between signers in conversation, known as 'signing space', is greater than that of a spoken conversation. The bigger a group in conversation, the bigger the signing space (Bauman, 2005).

SENSORY REACH

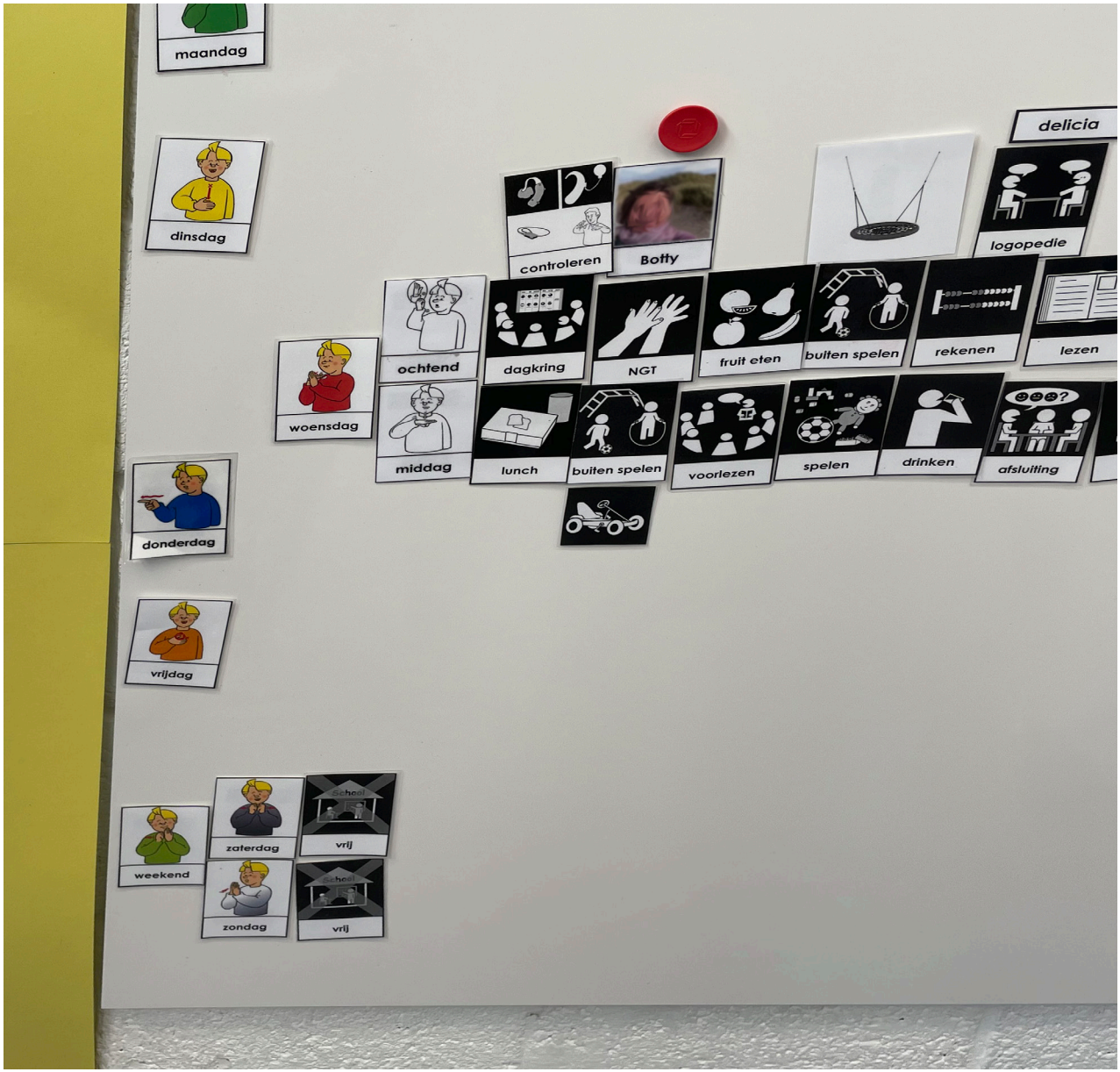
When a deaf person walks into space and they immediately 'read' the entire room to maintain control. They scan the environment and activities around them and see things that hearing people tend to overlook. Think of the movement of shadows or subtle changes in facial expressions and the positions of other people (Bauman, 2005).

LIGHT & COLOUR

Reading facial expression and lips, is crucial while signing. Glare, shadows or backlighting, but also wall colour that is similar to a person's skin tone, can interrupt and distract from conversations and can make reading peoples facial expressions and lips difficult. A lack of proper lighting and colour can lead to loss of concentration and even physical exhaustion (Bauman, 2005).

ACOUSTICS

Deaf people have different degrees of hearing levels and some use hearing aids to enhance sounds. No matter what level of hearing, sounds still can be extremely distracting, with or without hearing aids. The hum of air conditionings, loud echoes, reverberation or other background noises can all be distracting (Bauman, 2005).


maandag
dinsdag
woensdag
donderdag
vrijdag
weekend
zaterdag
zondag
vrij
vrij
controleren
Botty
ochtend
middag
dagkring
NGT
lunch
buiten spelen
fruit eten
voorlezen
buiten spelen
spelen
rekenen
drinken
delicia
logopedie
lezen
afsluiting

VISUAL SCHOOL P 01

STATEMENT
At a school for deaf and hard-of-hearing pupils the focus must be on the visual.

CLARIFICATION
Deaf and hard-of-hearing pupils are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. The difference between the cognitive development of deaf and hard-of-hearing and hearing pupils is in the way this knowledge is conveyed through language (Gaudiot & Martins, 2018). The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision. It is with the eyes that the deaf and hard-of-hearing can 'hear'. Meaning that it is also with the eyes that the deaf and hard-of-hearing learn. They are for example taught in (partly) NGT, *Nederlandse Gebarentaal*.

SOLUTION
To support the visual way of learning, the classroom must have a digiboard and walls with space for hanging and displaying items. For example, a board filled with pictograms to explain the daily schedule. Hallways must also have walls with space for hanging and displaying items. For example, TV screens and signposting.

RELATION
P 02 signposting
P 03 information signs
P 04 tv screens
P 05 school bell with lights
P 06 fire alarm with lights
P 07 flashing lights in gymnasium
P 14 table arrangement
P 20 adjustable digiboard
P 43 view of classrooms
P 69 colours on the road
P 71 correct wall colours

SOURCE
(Gaudiot & Martins, 2018)

SIGNPOSTING P 02

STATEMENT
To support the visual way of being, a deaf school must have signposting to give directions.

CLARIFICATION
Deaf and hard-of-hearing pupils are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. The difference between the cognitive development of deaf and hard-of-hearing and hearing pupils is in the way this knowledge is conveyed through language (Gaudiot & Martins, 2018). The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision. It is with the eyes that the deaf and hard-of-hearing can 'hear'.

SOLUTION
To support the visual way of being, a deaf school must have signposting to give directions. This allows the deaf and hard-of-hearing to navigate better during a walking signing conversation.

RELATION
P 01 visual school
P 03 information signs
P 04 tv screens

SOURCE
(Gaudiot & Martins, 2018)
Fieldwork: interviews Kentalis Guyot VSO and VSO Vries
Fieldwork: observation Dr. M. Polanoschool, Kentalis Guyot VSO and SO


KENTALIS
Koninklijke Kentalis
Naam: Meike Brul
Functie: Leerkracht
Werkdagen: Ma Di Wo Do Vr
Naam: Jeanette Mulder
Functie: Zorgbegeleider
Werkdagen: Ma
Naam: Marjon van Hertum
Functie: Zorgmedewerker
Werkdagen: Di Wo Do
LOKAAL 53 — GROEP CMB 5 - 6

INFORMATION SIGNS P 03

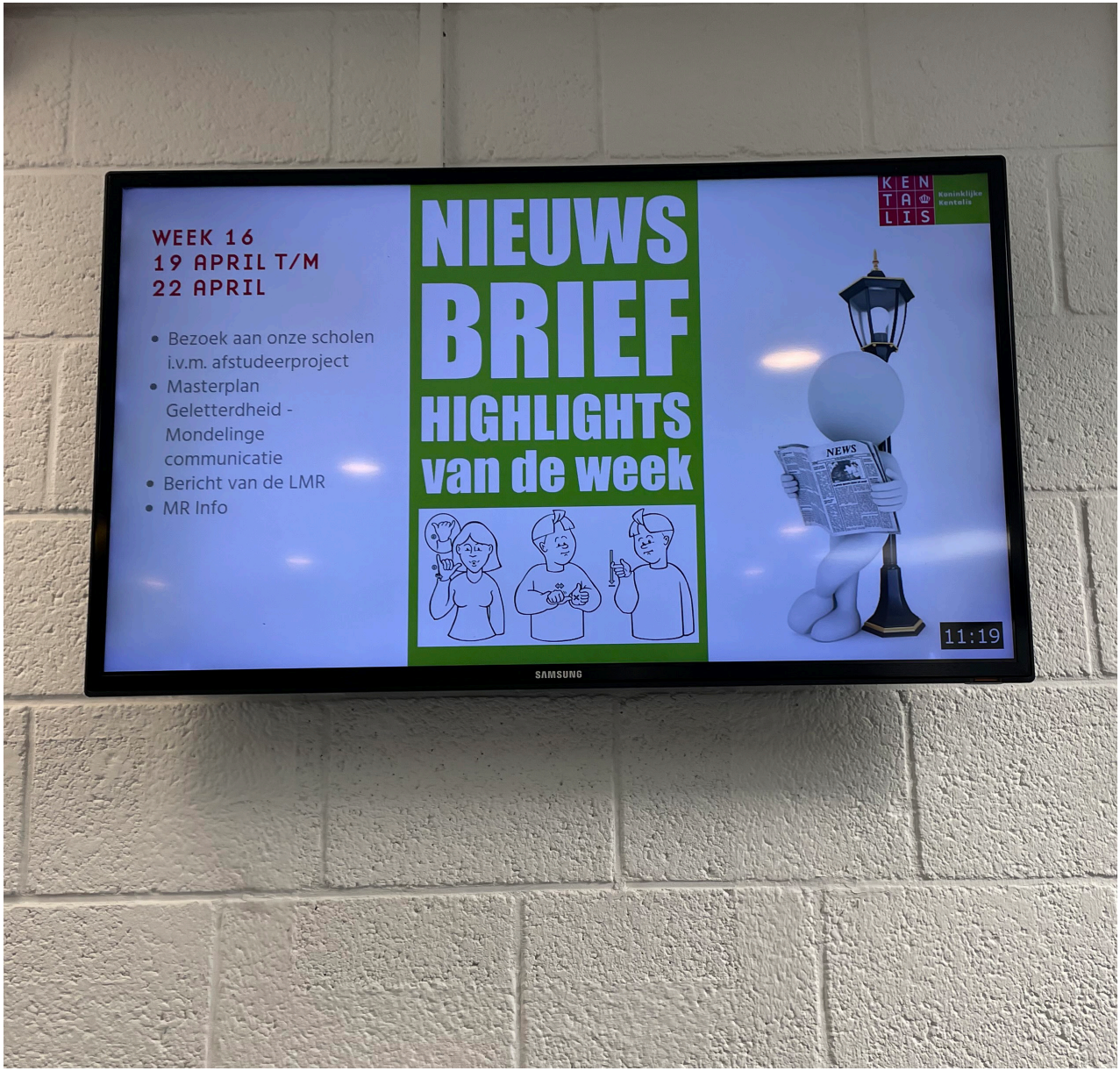
STATEMENT
To support the visual way of being, a deaf school must have information signs next to classrooms and offices.

CLARIFICATION
Deaf and hard-of-hearing pupils are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. The difference between the cognitive development of deaf and hard-of-hearing and hearing pupils is in the way this knowledge is conveyed through language (Gaudiot & Martins, 2018). The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision. It is with the eyes that the deaf and hard-of-hearing can 'hear'.

SOLUTION
To support the visual way of being, a deaf school must have information signs next to classrooms and offices. These information signs show, for example, who the teachers of a class are and when they work. This is done with both text and images. Because, when it comes to names, everyone in the deaf community has their own sign name. On information boards, it is useful to display both this sign name and written name.

RELATION
P 01 visual school
P 02 signposting
P 04 tv screens

SOURCE
(Gaudiot & Martins, 2018)
Fieldwork: interviews Kentalis Guyot VSO and VSO Vries
Fieldwork: observation Dr. M. Polanoschool, Kentalis Guyot VSO and SO


WEEK 16
19 APRIL T/M
22 APRIL
• Bezoek aan onze scholen i.v.m. afstudeerproject
• Masterplan Geletterdheid - Mondelinge communicatie
• Bericht van de LMR
• MR Info
NIEUWS BRIEF
HIGHLIGHTS van de week
KEN TA LIS
Koninklijke Kentalis
NEWS
11:19
SAMSUNG

TV SCREENS P 04

STATEMENT
To support the visual way of being, a deaf school must have TV screens.

CLARIFICATION
Deaf and hard-of-hearing pupils are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. The difference between the cognitive development of deaf and hard-of-hearing and hearing pupils is in the way this knowledge is conveyed through language (Gaudiot & Martins, 2018). The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision. It is with the eyes that the deaf and hard-of-hearing can 'hear'.

SOLUTION
To support the visual way of being, a deaf school must have TV screens with the school's information, news, coming activities, photos, the week's schedule, absent list etc.

RELATION
P 01 visual school
P 02 signposting
P 03 information signs

SOURCE
(Gaudiot & Martins, 2018)
Fieldwork: interviews Kentalis Guyot VSO and VSO Vries
Fieldwork: observation Dr. M. Polanoschool, Kentalis Guyot VSO and SO

SCHOOL BELL WITH LIGHTS P 05

STATEMENT
To support the visual way of being, a deaf school must have a school bell with lights.

CLARIFICATION
Deaf and hard-of-hearing pupils are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. The difference between the cognitive development of deaf and hard-of-hearing and hearing pupils is in the way this knowledge is conveyed through language (Gaudiot & Martins, 2018). The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision. It is with the eyes that the deaf and hard-of-hearing can 'hear'. Looking specifically at the school bell, this means that a school bell with sound does not work for deaf education.

SOLUTION
To support the visual way of being, a deaf school must have a school bell with lights. When the school bell rings, this means that the lights of the school bell will flicker.

RELATION
P 01 visual school
P 06 fire alarm with lights
P 07 flashing lights in gymnasium

SOURCE
(Gaudiot & Martins, 2018)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis Guyot VSO and SO, Kentalis Compas College and Kentalis College Zoetermeer
Fieldwork: observation Kentalis Compas College, Kentalis Guyot VSO and SO

FIRE ALARM WITH LIGHTS P 06

STATEMENT
To support the visual way of being, a deaf school must have a fire alarm with lights

CLARIFICATION
Deaf and hard-of-hearing pupils are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. The difference between the cognitive development of deaf and hard-of-hearing and hearing pupils is in the way this knowledge is conveyed through language (Gaudiot & Martins, 2018). The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision. It is with the eyes that the deaf and hard-of-hearing can 'hear'. Looking specifically at the school bell, this means that a fire alarm with sound does not work for deaf education.

SOLUTION
To support the visual way of being, a deaf school must have a fire alarm with lights. When the fire alarm goes off, this means that the lights of the fire alarm will flicker.

RELATION
P 01 visual school
P 05 school bell with lights
P 07 flashing lights in gymnasium

SOURCE
(Gaudiot & Martins, 2018)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis Guyot VSO and SO, Kentalis Compas College and Kentalis College Zoetermeer
Fieldwork: observation Kentalis Compas College, Kentalis Guyot VSO and SO


PHILIPS

FLASHING LIGHTS IN GYMNASIUM P 07

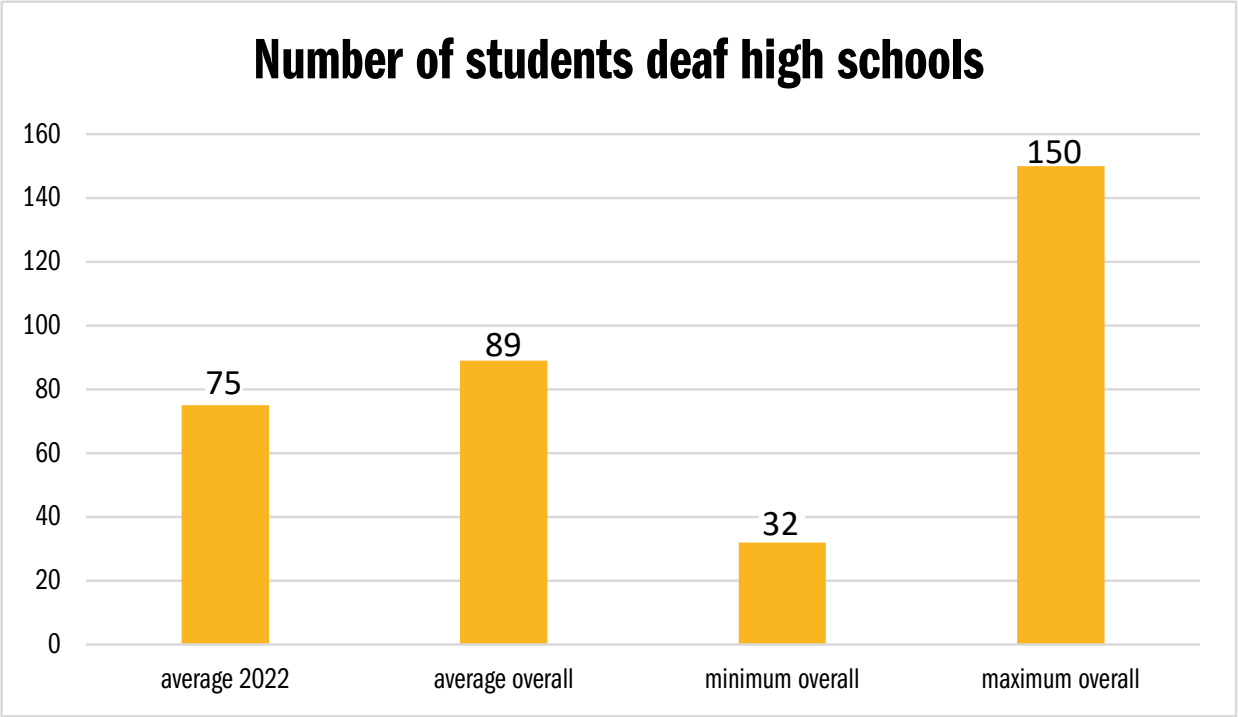
STATEMENT
To support the visual way of being, a deaf school's gymnasium must have flashing lights.

CLARIFICATION
Deaf and hard-of-hearing pupils are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. The difference between the cognitive development of deaf and hard-of-hearing and hearing pupils is in the way this knowledge is conveyed through language (Gaudiot & Martins, 2018). The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision. It is with the eyes that the deaf and hard-of-hearing can 'hear'. Looking specifically at gym classes at a deaf school, it is difficult to attract pupils' attention during an activity. Pupils are busy with the activity and therefore not focused on the teacher.

SOLUTION
In order to attract the attention of pupils during gym class, it is important that there are several flashing lights in the walls. The teacher can control these lights with a remote control in order to attract the attention of pupils at any time.

RELATION
P 01 visual school
P 05 school bell with lights
P 06 fire alarm with lights

SOURCE
(Gaudiot & Martins, 2018)
Fieldwork: interviews Kentalis Guyot VSO
Fieldwork: observation Kentalis Guyot VSO


Number of students deaf high schools
160
140
120
100
80
60
40
20
0
75
89
32
150
average 2022
average overall
minimum overall
maximum overall

VARYING NUMBER OF PUPILS P 08

STATEMENT
In deaf education, the number of pupils per class varies. Classrooms must be designed accordingly.

CLARIFICATION
The number of pupils per class at a deaf school is small. A group consists of 7 pupils on average (Doof.nl, 2018). However, this varies enormously. The number can be as high as 14 and as low as 3.

SOLUTION
Classrooms must be designed with this varying number of pupils in mind. Therefore, a classroom must be flexible.

RELATION
P 09 deaf eduction is diverse
P 14 flexible classrooms
P 17 extra desks

SOURCE
(Doof.nl, 2018)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries

DEAF EDUCATION IS DIVERSE P 09

STATEMENT
Deaf education is diverse.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is referred to as CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). An example for this are pupils in wheelchairs. To be precise, two types of education are distinguished in deaf schools: CMB and DSH, *doof en slechthorend* (Kentalis, n.d.-a). Furthermore, the IQ of pupils in deaf schools also varies.

SOLUTION
When designing a deaf school, it is important to take this diverse education into account.

RELATION
P 08 varying numbers of students
P 17 extra desks
P 18 adjustable desks
P 19 adjustable chairs
P 24 extra spaces for extra functions
P 52 no thresholds
P 53 no unexpected steps
P 54 no stairs
P 69 colours on the road
P 70 railings on walls

SOURCE
(Kentalis, n.d.-a)
(Kentalis, n.d.-b)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis Guyot VSO and Kentalis Compas College


KENTALIS GUYOT VSO
KENTALIS GUYOT SO

PRIMARY AND SECONDARY SCHOOL IN ONE PLACE P 10

STATEMENT
A primary and secondary school must be on the same site.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is also called CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). Among the CMB pupils there are some pupils with a low IQ. For them the transition between primary and secondary school is difficult.

SOLUTION
To make the transition between primary and secondary school easier, it is helpful if the two are in the same location. Moreover, it is also beneficial for the cooperation between the schools.

RELATION
P 11 close to hearing school
P 12 close to highway

SOURCE
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis College Zoetermeer, Kentalis Guyot VSO, SO and VSO Vries


CAMBIUM COLLEGE
DE WAARD
DE BRUG PRACTICAL
EDUCATION
TO BE CONSTRUCTED NEW
KENTALIS COMPAS COLLEGE

CLOSE TO A HEARING SCHOOL P 11

STATEMENT
In order to establish cooperation with the hearing world, it is important that a deaf school is located close to a hearing school.

CLARIFICATION
The deaf world and the hearing world are two different worlds and they hardly mix. In the hearing world, which is based on auditory communication and signals, the deaf are at a disadvantage. But vice versa, hearing people are at a disadvantage in the deaf world that is based on the visual with also a visual language (Tijsseling, 2018). However, both worlds benefit from each other. They can learn from each other. In order to do that, a bridge between the two worlds has to be built.

SOLUTION
This bridge is also important to build in schools. Hearing and deaf pupils can learn from each other. For example, deaf pupils can learn to communicate with hearing pupils and hearing pupils with deaf pupils. In order to establish cooperation with the hearing world, it is important that a deaf school is located close to a hearing school. Through cooperation, it can be achieved that deaf people are no longer excluded from the hearing world, but become a part of it.

RELATION
P 10 primary and secondary school in one place
P 12 close to highway

SOURCE
(Tijsseling, 2018)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO and SO


AURIS DR. M. POLANOSCHOOL

CLOSE TO HIGHWAY P 12

STATEMENT
A school must have a good and fast connection to the highway.

CLARIFICATION
Due to the small number of deaf schools and the uneven distribution in the Netherlands, almost all pupils live far away from school. They therefore travel by taxi, with travel times being up to two hours. Furthermore, if a deaf school is not well connected to a highway, it means that the taxis have to drive a long distance before they reach the highway. Often these places get very busy during rush hour and are therefore prone to traffic jams, making travel times even longer.

SOLUTION
To reduce travel times, it is important to locate the school where there is a good and fast connection to the highway. The closer a school is to a highway, the faster pupils will be at home.

RELATION
P 10 primary and secondary school in one place
P 11 close to hearing school
P 37 kiss & ride

SOURCE
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries
Research: Dutch deaf schools

LISTEN TO THE DEAF AND HARD-OF-HEARING P 13

STATEMENT
Listen to the deaf and hard-of-hearing, they are the experts.

CLARIFICATION
Quite often, designs are made for specific target groups without really listening to them. Such has also often been the case with deaf schools. An example of this is Kentalis College Zoetermeer. The architects did not listen carefully to the deaf and hard-of-hearing at the school, resulting in many problems with the design. If a school for deaf and hard-of-hearing pupils was never designed while listing to them, how can these buildings reflect and be good for them?

SOLUTION
When designing for a specific target group, it is important to listen to this target group. The deaf and hard-of-hearing themselves have the most knowledge about what does or does not work for them. Take this into account, start the conversation and listen.

RELATION
P 65 hallway and classroom floors separate

SOURCE
Fieldwork: interviews Kentalis College Zoetermeer and Kentalis Compas College
Fieldwork: observations Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries


jklmnopqrstuvwxyz

FLEXIBLE CLASSROOMS P 14

STATEMENT
To accommodate the varying number of pupils and use of classrooms, classrooms must be flexible.

CLARIFICATION
Deaf and hard-of-hearing pupils are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. The difference between the cognitive development of deaf and hard-of-hearing and hearing pupils is in the way this knowledge is conveyed through language (Gaudiot & Martins, 2018). The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision. It is with the eyes that the deaf and hard-of-hearing can 'hear'. Meaning that it is also with the eyes that the deaf and hard-of-hearing learn. To support this visual way of learning, classrooms have a digiboard and walls with space for hanging and displaying items. For example, a board filled with pictograms to explain the daily schedule. In addition, the way of teaching in schools for the deaf is flexible, which means, among other things, that teaching takes place in different table arrangements. Furthermore the number of pupils per class at a school for the deaf is small: 7 pupils on average (Doof.nl, 2018). However, this varies. The number can be as high as 14 and as low as 3.

SOLUTION
To accommodate the visual way of learning, the varying number of pupils and use of classrooms, a classroom must be designed with flexibility in mind.

RELATION
P 08 varying number of students
P 16 table arrangement
P 17 extra desks
P 21 two teachers
P 22 flexible desks for teachers

SOURCE
(Doof.nl, 2018)
(Gaudiot & Martins, 2018)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Guyot VSO and SO

ROUND/OVAL TABLES P 15

STATEMENT
A school must have round or oval tables to allow for overview and sensory reach.

CLARIFICATION
Deaf people are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. To explain: when deaf people walk into space they immediately 'read' the entire room to maintain control. Think of the movement of shadows or subtle changes in facial expressions and the positions of other people. They scan the environment and activities around them and see things that hearing people tend to overlook (Bauman, 2005). This is also called sensory reach. This is also the case at tables. Deaf and hard-of-hearing people want to have a good overview of the entire table and be able to see everyone at the table. With a rectangular table, the problem is that you can not simultaneously see the person next to you and across from you sign or be able to read both their lips and facial expressions.

SOLUTION
In order to provide overview and sight lines to everyone at the table, the solution is a round or oval table.

RELATION
P 16 table arrangement

SOURCE
(Bauman, 2005)
Fieldwork: interviews Kentalis Guyot College VSO
Fieldwork: observations Kentalis Compas College, Kentalis Guyot VSO and SO


MONDIAL MOVERS
MEMO
GESCHIEDENIS

TABLE ARRANGEMENT P 16

STATEMENT
The table arrangement of a classrooms must give a clear view of the board, the teachers and the pupils.

CLARIFICATION
Deaf and hard-of-hearing pupils are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. The difference between the cognitive development of deaf and hard-of-hearing and hearing pupils is in the way this knowledge is conveyed through language (Gaudiot & Martins, 2018). The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision. It is with the eyes that the deaf and hard-of-hearing can 'hear'. Meaning that it is also with the eyes that the deaf and hard-of-hearing learn. They are for example taught in (partly) NGT, *Nederlandse Gebarentaal*. Pupils must be able to see the board, the teacher and each other at all times. The way the tables are positioned therefore has a great influence.

SOLUTION
The following three table arrangements work well for deaf and hard-of-hearing people: a horseshoe/U-shape, group and half moon/half circle. All three table arrangements provide a view of the board, the signing teacher and the signing fellow pupils. In addition, faces are always visible for lip reading and reading facial expressions.

RELATION
P 14 flexible classrooms
P 15 round/oval tables
P 17 extra desks
P 21 two teachers
P 22 flexible desks for teachers

SOURCE
(Gaudiot & Martins, 2018)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries
Fieldwork: observations Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries


jklmnopqrstuvwxyz

EXTRA DESKS P 17

STATEMENT
Give each pupil two desks.

CLARIFICATION
During explanations, pupils sit in table arrangement facing the teacher. This arrangement is not always suitable for independent work or group work. Desks must be moved if this is the case. This results in lost learning time.

SOLUTION
To prevent the desks from moving, it is useful to have extra desks in the room. In this way, every pupil has two desks: one for paying attention during the lesson and one for independent work or group work.

RELATION
P 08 varying number of pupils
P 09 deaf eduction is diverse
P 14 flexible classrooms
P 16 table arrangement
P 56 additional lighting

SOURCE
Fieldwork: interviews Dr. M. Polanoschool and Kentalis College Zoetermeer
Fieldwork: observations Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO and SO

ADJUSTABLE DESKS P 18

STATEMENT
Each pupil must be able to sit at a desk that can be adjusted to suit their needs.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is referred to as CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). To be precise, two types of education are distinguished in deaf schools: CMB and DSH, *doof en slechthorend* (Kentalis, n.d.-a). Among the CMB pupils there are often children in wheelchairs. Children in wheelchairs must be able to sit at the desk during lessons. Every child is unique and so is every wheelchair. This means that there are different sizes of wheelchairs. If a desk has a standard height, this can mean that wheelchairs do not fit under the desk.

SOLUTION
To make desks accessible for every child, including those in a wheelchair, desks must be adjustable. In this way, the height can be adjusted specifically for each child.

RELATION
P 09 deaf education is diverse
P 19 adjustable chairs
P 20 adjustable digiboard

SOURCE
(Kentalis, n.d.-a)
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis Guyot VSO, SO and VSO Vries
Fieldwork: observations Kentalis Guyot VSO, SO and VSO Vries

ADJUSTABLE CHAIRS P 19

STATEMENT
Each pupil must be able to sit on a chair that can be adjusted to suit their needs.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is referred to as CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). To be precise, two types of education are distinguished in deaf schools: CMB and DSH, *doof en slechthorend*. Among the CMB pupils there are often children who (partly) use wheelchairs. Pupils who (partly) use wheelchairs must have the possibility to sit on chairs during lessons.

SOLUTION
To make chairs accessible for every child chairs must be adjustable. In this way, the height can be adjusted specifically for each child.

RELATION
P 09 deaf education is diverse
P 18 adjustable desks
P 20 adjustable digiboard

SOURCE
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis Guyot VSO, SO and VSO Vries
Fieldwork: observations Kentalis Guyot VSO, SO and VSO Vries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plastic
paashaas
pop
paasei
paard
Aicha gaat naar opa

ADJUSTABLE DIGIBOARDS P 20

STATEMENT
The deaf and hard-of-hearing are visual learners with the digiboard as an important learning tool.

CLARIFICATION
Deaf and hard-of-hearing pupils are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. The difference between the cognitive development of deaf and hard-of-hearing and hearing pupils is in the way this knowledge is conveyed through language (Gaudiot & Martins, 2018). The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision. It is with the eyes that the deaf and hard-of-hearing can 'hear'. Meaning that it is also with the eyes that the deaf and hard-of-hearing learn. They are for example taught in (partly) NGT, *Nederlandse Gebarentaal*. This way of learning is supported with use of a digiboard.

SOLUTION
In order to accommodate the different teaching styles, a digiboard must be adjustable. For example, the board may be higher in one classroom than in another, or a teacher may be able to adjust the height during the lesson itself. The digiboard must accommodate this.

RELATION
P 01 visual school
P 18 adjustable desks
P 19 adjustable chairs

SOURCE
(Gaudiot & Martins, 2018)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis Guyot VSO, SO and VSO Vries
Fieldwork: observations Dr. M. Polanoschool, Kentalis Compas College, Kentalis College Zoetermeer, Kentalis Guyot VSO, SO and VSO Vries


MEMO
GESCHICHTE

TWO TEACHERS P 21

STATEMENT
Classrooms must be able to accommodate more than one teacher.

CLARIFICATION
In deaf schools, especially in primary schools, there are often two teachers present in the classroom. One as a care worker and the other as a tutor (Kentalis, n.d.-a). This is mainly the case with CMB education, *communicatief meervoudige beperking*, one of two forms of education in deaf schools: CMB and DSH, *doof en slechthorend* (Kentalis, n.d.-b). However, due to the smaller number of pupils per class in deaf education, classrooms are small. This means that two teachers often have to share their desk.

SOLUTION
Classrooms must be designed with flexibility in mind. There must be enough space in a classroom for more than one desk when there is more than one teacher.

RELATION
P 14 flexible classrooms
P 16 table arrangement
P 22 flexible desks for teachers

SOURCE
(Kentalis, n.d.-a)
(Kentalis, n.d.-b)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis Compas College and Kentalis Guyot SO
Fieldwork: observations Dr. M. Polanoschool, Kentalis Compas College, Kentalis Guyot SO and VSO Vries


JUNIOR
Donald Duck

FLEXIBLE DESKS FOR TEACHERS P 22

STATEMENT
Desks for teachers must accommodate different teaching methods.

CLARIFICATION
Every teacher is unique and so is the way of teaching. One teacher may prefer to teach sitting down, another standing up and another a combination. Because education at a school for the deaf is focused on the visual, the way of teaching is especially important. After all, the teacher must always be visible.

SOLUTION
To accommodate the different teaching methods, teachers' desks must be flexible. This means that the height can be adjusted and that a desk is equipped with wheels. This allows teaching to take place while standing or sitting in any location, while the teacher remains visible to the pupils at all times.

RELATION
P 14 flexible classrooms
P 16 table arrangement
P 21 two teachers

SOURCE
Fieldwork: observations Kentalis Guyot VSO, SO and VSO Vries

CLOSED CUPBOARDS P 23

STATEMENT
Cupboards in classrooms must be closed in order not to distract.

CLARIFICATION
Deaf and hard-of-hearing pupils are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. The difference between the cognitive development of deaf and hard-of-hearing and hearing pupils is in the way this knowledge is conveyed through language (Gaudiot & Martins, 2018). The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision. It is with the eyes that the deaf and hard-of-hearing can 'hear'. Meaning that it is also with the eyes that the deaf and hard-of-hearing learn. If the cupboards in a classroom are open, it can create a very cluttered appearance. Meaning that the open cupboard will be of great distraction to pupils. Their gaze goes to the cupboards and not to the teacher, but since deaf and hard-of-hearing pupils learn and hear with their eyes, this will result in them missing the whole lesson.

SOLUTION
To avoid the distraction cupboards of classrooms must be closed.

RELATION
P 36 enough storage space
P 43 view of classroom
P 57 no windows from floor to ceiling
P 61 silent ventilation
P 65 hallways and classroom floors separate
P 71 correct wall colours

SOURCE
(Gaudiot & Martins, 2018)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Guyot SO and VSO Vries
Fieldwork: observations Dr. M. Polanoschool, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries


DESINFECTIE
BLUE

EXTRA SPACES FOR EXTRA FUNCTIONS P 24

STATEMENT
A school must have spaces for extra functions for a speech therapist, coach, physiotherapist, etc.

CLARIFICATION
In deaf education, there are many additional functions within the school that focus on deafness. Think of a speech therapist, coach, physiotherapist, etc. Pupils can easily get help when needed. Think for example of CMB pupils in a wheelchair (Kentalis, n.d.-b). Some of them have to visit the physiotherapist every week. When this can be done at school, it saves a lot of time.

SOLUTION
It is important that a school offers sufficient space for these additional functions within a school.

RELATION
P 09 deaf education is diverse
P 25 relax room
P 27 workshop classrooms
P 28 outdoor classrooms
P 29 surroundings for walking
P 30 kitchen and laundry room
P 33 boarding house
P 34 storage for suitcases
P 35 wheelchair parking area
P 37 kiss & ride

SOURCE
(Kentalis, n.d.-b)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Guyot VSO and SO
Fieldwork: observations Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO and SO

RELAX ROOM P 25

STATEMENT
A school must have a relax room where deaf and hard-of-hearing can de-stress and relax.

CLARIFICATION
Deaf and hard-of-hearing pupils are often tired or stressed because of the continuous use of their eyes, the constant switching of their attention and direction of vision, focusing on teachers and blocking and ignoring background noise and distractions (van der Wilk, 2020).

SOLUTION
In order to be able to de-stress and relax properly, it is important for pupils to have a place at school where they can do so: a relax room where a pupil can retreat for a while.

RELATION
P 24 extra spaces for extra functions
P 27 workshop classrooms
P 28 outdoor classrooms
P 29 surroundings for walking
P 30 kitchen and laundry room

SOURCE
(van der Wilk, 2020)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Guyot VSO, SO and VSO Vries
Fieldwork: observations Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries


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STAFF ROOM NEXT TO AUDITORIUM P 26

STATEMENT
The school's staff rooms must be next to the auditorium.

CLARIFICATION
Teachers want to be able to see pupils who use the auditorium to maintain control. The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision (Gaudiot & Martins, 2018). Meaning that for deaf teachers in particular, it is important that there are good sight lines from the staff room to the auditorium.

SOLUTION
In order to maintain control and keep overview of pupils using the auditorium, it is important that the staff room is located next to the auditorium.

RELATION
P 41 auditorium with sight lines
P 42 tribune in auditorium

SOURCE
(Gaudiot & Martins, 2018)
Fieldwork: interviews Kentalis Guyot VSO and SO
Fieldwork: observations Kentalis College Zoetermeer, Kentalis Guyot VSO and SO


METAAL
HOUT

WORKSHOP CLASSROOMS P 27

STATEMENT
A deaf school must have workshop rooms to give practical lessons.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is also called CMB education, *communicatief meervoudige beperking*. These pupils often have lessons such as woodwork, steel, art etc.

SOLUTION
In order to give lessons such as woodwork, steel, art etc., it is of importance that a school has workshop rooms.

RELATION
P 24 extra spaces for extra functions
P 25 relax room
P 28 outdoor classrooms
P 29 surroundings for walking
P 30 kitchen and laundry room

SOURCE
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College and Kentalis Guyot VSO
Fieldwork: observations Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College and Kentalis Guyot VSO

OUTDOOR CLASSROOMS P 28

STATEMENT
A deaf school must have outdoor 'classrooms' to give practical outdoor lessons.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is also called CMB education, *communicatief meervoudige beperking*. These pupils often have lessons outside. They can learn how to maintain a garden and look after a vegetable garden outside, as well as how to lay paths or look after animals.

SOLUTION
In order to give lessons outside, it is of importance that a school has space for this. A school therefore needs places for a vegetable garden, animals, a sensory garden, maintenance etc.

RELATION
P 24 extra spaces for extra functions
P 25 relax room
P 27 workshop classrooms
P 29 surroundings for walking
P 30 kitchen and laundry room

SOURCE
Fieldwork: interviews Dr. M. Polanoschool and Kentalis Guyot VSO
Fieldwork: observations Dr. M. Polanoschool and Kentalis Guyot VSO

SURROUNDINGS FOR WALKING P 29

STATEMENT
The school must be in an environment safe and pleasant for walking.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is also called CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). There are also schools with only CMB pupils. In addition, these pupils have a low IQ, which means that their school day is structured differently from regular education for the deaf. One of the important parts of the day is going out for a walk. This takes place twice a day.

SOLUTION
To be able to walk with pupils, it is important for teachers and pupils that the school is in a safe and pleasant environment. Preferably in a car-free area, so pupils can walk around freely. In addition, it is important that the walking route is accessible for wheelchairs, as some pupils may be in a wheelchair.

RELATION
P 24 extra spaces for extra functions
P 25 relax room
P 27 workshop classrooms
P 28 outdoor classrooms
P 30 kitchen and laundry room

SOURCE
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis Guyot VSO Vries


vieze was

KITCHEN AND LAUNDRY ROOM P 30

STATEMENT
For CMB eduction it is important to have a laundry room and kitchen in the school.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is also called CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). There are also special schools with only CMB pupils. In addition, the pupils of these schools have a low IQ, which means that their school day is structured differently from regular education for the deaf. The curriculum of these pupils is focused on becoming independent and taking care of themselves. For example, they are taught how to do their laundry or learn how to cook.

SOLUTION
To be able to give these cooking and washing lessons, it is important to have a laundry room and kitchen in the school. In addition, it is important that both the kitchen and the laundry room are accessible to wheelchairs, as some pupils may be in wheelchairs.

RELATION
P 24 extra spaces for extra functions
P 25 relax room
P 27 workshop classrooms
P 28 outdoor classrooms
P 29 surroundings for walking
P 31 high-low kitchen
P 32 kitchen with overview

SOURCE
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis Guyot VSO Vries

HIGH-LOW KITCHEN P 31

STATEMENT
Kitchens must be adjustable in height to support wheelchair users.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is also called CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). There are also special schools with only CMB pupils. In addition, the pupils of these schools have a low IQ, which means that their school day is structured differently from regular education for the deaf. The curriculum of these pupils is focused on becoming independent and taking care of themselves. For example, they are taught how to cook and do the dishes. Among the CMB pupils there are often children in wheelchairs. However, a normal kitchen is not accessible for pupils in wheelchairs: the kitchen counter is often too high to reach and the kitchen cupboards are often in the way. However, it is important that all pupils can follow their lessons. Pupils in wheelchairs must also be able to follow cooking lessons.

SOLUTION
To be able to give these cooking and cleaning lessons for all pupils, it is important to have a adjustable kitchens in the school. It must be made possible to adjust the height of the kitchen to make it accessible to pupils in wheelchairs.

RELATION
P 30 kitchen and laundry
P 32 kitchen with overview

SOURCE
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis Guyot VSO, SO and VSO Vries
Fieldwork: observations Kentalis Guyot VSO, SO and VSO Vries


HONGAARSE GOULASH
CUP A SOUP
INDIASE KERRIE
CUP A SOUP
D.E

KITCHEN WITH OVERVIEW P 32

STATEMENT
A kitchen for the deaf and hard-of-hearing must provide an overview to the rest of the room.

CLARIFICATION
Deaf people are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. To explain: when deaf people walk into space they immediately 'read' the entire room to maintain control. Think of the movement of shadows or subtle changes in facial expressions and the positions of other people. They scan the environment and activities around them and see things that hearing people tend to overlook (Bauman, 2005). This is also called sensory reach. Meaning that the deaf and hard-of-hearing want to have a constant overview of a room. In other words, they prefer not to have their back turned to a room. However, when using a kitchen, this is often the case. Kitchens are often oriented against a wall, resulting in a deaf or hard-of-hearing person standing with their back to a room. When we look at, for example, a staff room with a kitchen, this means that when the kitchen is on the wall, a deaf teacher will have their back turned to the rest of the staff room. In other words, there is no overview of the room.

SOLUTION
In order for deaf and hard-of-hearing people to always have an overview of a room when using the kitchen, it is important that a kitchen is not oriented towards a wall. A solution for this is a kitchen island.

RELATION
P 30 kitchen and laundry
P 31 high-low kitchen

SOURCE
(Bauman, 2005)
Fieldwork: interviews Kentalis Guyot VSO, SO and VSO Vries
Fieldwork: observations Kentalis Guyot VSO, SO and VSO Vries

BOARDING HOUSE P 33

STATEMENT
A deaf school must have a boarding house.

CLARIFICATION
Due to the small number of deaf schools and the uneven distribution in the Netherlands, almost all pupils live far away from school. They therefore travel by taxi, with travel times being up to two hours. However, it also happens that pupils live so far away from school that it is impossible to travel back and forth every day.

SOLUTION
When a school has a boarding house, it means that the school is available for a larger group of pupils. Pupils who live too far away to travel every day can stay at the boarding house near the school during the week. This allows the pupils to use the hours gained from not having to travel for their personal use.

RELATION
P 24 extra spaces for extra functions
P 34 storage for suitcases

SOURCE
Fieldwork: interviews Kentalis Guyot VSO

STORAGE FOR SUITCASES P 34

STATEMENT
A deaf school must have storage space for suitcases for pupils living at the school's boarding house.

CLARIFICATION
Due to the small number of deaf schools and the uneven distribution in the Netherlands, almost all pupils live far away from school. They therefore travel by taxi, with travel times being up to two hours. However, it also happens that pupils live so far away from school that it is impossible to travel back and forth every day. In cases like this a pupil can live at the school's boarding house during the week. This means that pupils come to school on mondays from their parents' homes with their suitcases and belongings for the week. After school on monday they then go on to the boarding house. On fridays, the suitcases are taken to school in the morning so that they can go back to their parents after school. This means that the suitcases are at school two days a week.

SOLUTION
To keep the hallways free for walking and signing, it is important that the school has storage space for suitcases of pupils who use the boarding house.

RELATION
P 24 extra spaces for extra functions
P 33 boarding house
P 36 enough storage space

SOURCE
Fieldwork: interviews Kentalis Guyot VSO
Fieldwork: observations Kentalis Guyot VSO


HOUD
1,5 m
AFSTAND
DOOF

WHEELCHAIR PARKING AREA P 35

STATEMENT
A deaf school must have a space where wheelchairs can be parked.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is referred to as CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). Among the CMB pupils there are often children in wheelchairs. Not all pupils are always in a wheelchair. For some, the wheelchair serves as support and is therefore not always used.

SOLUTION
When pupils are not using their wheelchair, it is important that there is a suitable place to park it. This must not be in the walking route, as they then block space or act as hazards. Because, when walking together in conversation deaf people tend to keep a wide distance from another for clear visual communication using sign language. It is therefore important that hallways are wide and are free of hazards.

RELATION
P 24 extra spaces for extra functions
P 36 enough storage space
P 49 wide hallways

SOURCE
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis Guyot VSO, SO and VSO Vries
Fieldwork: observations Kentalis Guyot VSO, SO and VSO Vries

ENOUGH STORAGE SPACE P 36

STATEMENT
A school must have enough storage space.

CLARIFICATION
Schools often have little storage space. This often leads to schools' own solutions by using hallways for extra storage. For a deaf school, however, this leads to a problem: hallways become too narrow to walk and sign in. When walking together in conversation deaf people tend to keep a wide distance from another for clear visual communication using sign language (Bauman, 2005). It is therefore important that hallways are wide.

SOLUTION
It is important to think of enough storage space when designing. In addition, the eye must be on the future, because when schools grow, more storage space will be needed.

RELATION
P 23 closed cupboards
P 34 storage for suitcases
P 35 wheelchair parking area
P 49 wide hallways

SOURCE
(Bauman, 2005)
Fieldwork: interviews Kentalis Guyot SO
Fieldwork: observations Kentalis Guyot SO


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KISS & RIDE P 37

STATEMENT
A deaf school must have a Kiss & Ride to pick up and drop off pupils.

CLARIFICATION
Due to the small number of deaf schools and the uneven distribution in the Netherlands, almost all pupils live far away from school. They therefore travel by taxi, with travel times being up to two hours. This translates to a Kiss & Ride for a deaf school, where pupils can be dropped off and picked up. Where the Kiss & Ride at a hearing school is a luxury, for a deaf school it is an essential component.

SOLUTION
To accommodate the large number of pupils travelling by taxi, it is important that a deaf school has a Kiss & Ride. It is important that the Kiss & Ride is a safe place for pupils. The Kiss & Ride must have a clear route and clear pick-up/drop-off points. It is also essential that there is good flow of traffic possible to prevent traffic jams. A solution for this can be a wide Kiss & Ride. Lastly a good overview off the Kiss & Ride is essential for deaf pupils in order to feel safe and be able to read the area.

RELATION
P 12 close to high way
P 38 kiss & ride parking area
P 39 parking
P 69 colours on the road

SOURCE
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries
Fieldwork: observation Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries
Research: Dutch deaf schools

KISS & RIDE WAITING AREA P 38

STATEMENT
The Kiss & Ride must have a waiting area that is both safe and resistant to all weather conditions.

CLARIFICATION
Due to the small number of deaf schools and the uneven distribution in the Netherlands, almost all pupils live far away from school. They therefore travel by taxi, with travel times being up to two hours. This translates to a Kiss & Ride for a deaf school, where pupils can be dropped off and picked up. Where the Kiss & Ride at a hearing school is a luxury, for a deaf school it is an essential component. After school when pupils are waiting to be picked up, pupils wait outside the school on the curb. This can make for unsafe situations.

SOLUTION
In order to keep the Kiss & Ride a safe and usable place it is important to have a waiting area near the Kiss & Ride. This waiting area must provide an overview and sight lines over the entire Kiss & Ride, so that pupils can easily see if their taxi has arrived. Furthermore, it is convenient if this waiting area is sheltered from rain, cold and sun, since the Kiss & Ride is in use all year round in all seasons.

RELATION
P 37 kiss & ride

SOURCE
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer and Kentalis Guyot VSO
Fieldwork: observation Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries

PARKING P 39

STATEMENT
It is useful to have parking areas near the Kiss & Ride where taxis that arrive too early can park and wait.

CLARIFICATION
Due to the small number of deaf schools and the uneven distribution in the Netherlands, almost all pupils live far away from school. They therefore travel by taxi, with travel times being up to two hours. This translates to a Kiss & Ride for a deaf school, where pupils can be dropped off and picked up. As for the taxis, there are situations where taxi's arrive before the to be picked up pupils.

SOLUTION
In order to prevent congestion on the Kiss & Ride, it is useful to have parking areas near the Kiss & Ride where the taxis that arrive too early can park and wait.

RELATION
P 37 kiss & ride

SOURCE
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer and Kentalis Guyot VSO
Fieldwork: observation Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries

SIGHT LINES IN HALLWAYS P 40

STATEMENT
Hallways must have clear sight lines to allow for signing conversations and sensory reach.

CLARIFICATION
When walking together in conversation deaf people tend to keep a wide distance from another for clear visual communication using sign language. During a conversation signers will also shift their gaze between the conversation and their surroundings keeping a close eye for hazards and maintaining proper direction. Furthermore, deaf people are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings (Bauman, 2005). To explain: when deaf people walk into space they immediately 'read' the entire room to maintain control. Think of the movement of shadows or subtle changes in facial expressions and the positions of other people. They scan the environment and activities around them and see things that hearing people tend to overlook. This is also called sensory reach. Both of these principles do not work if a hallway does not have clear sight lines.

SOLUTION
When there are clear sight lines deaf people will both be able to scan the hallways better for hazards and to have better sensory reach in the hallways.

RELATION
P 45 glass in doors
P 47 glass interior walls
P 48 transparent lifts
P 49 wide hallways
P 50 clear areas for coats, desks and art
P 51 no corner walls
P 59 light hallways
P 67 clear walking routes

SOURCE
(Bauman, 2005)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Guyot VSO and SO
Fieldwork: observations Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College Kentalis Guyot VSO and SO

AUDITORIUM WITH SIGHT LINES P 41

STATEMENT
A school for the deaf must have a large open auditorium with sight lines and good overview.

CLARIFICATION
Deaf people are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings (Gaudiot & Martins, 2018). To explain: when deaf people walk into space they immediately 'read' the entire room to maintain control. Think of the movement of shadows or subtle changes in facial expressions and the positions of other people. They scan the environment and activities around them and see things that hearing people tend to overlook (Bauman, 2005). This is also called sensory reach.

SOLUTION
The auditorium is one of the most important spaces in a school and must therefore reflect its users. The design of the auditorium for a deaf school must therefore be based around visual range. The auditorium must be a large open space with sight lines and good overview.

RELATION
P 26 staff room next to auditorium
P 42 tribune in auditorium

SOURCE
(Bauman, 2005)
(Gaudiot & Martins, 2018)
Fieldwork: interviews Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO and SO
Fieldwork: observations Kentalis College Zoetermeer, Kentalis Compas College Kentalis Guyot VSO and SO

TRIBUNE IN AUDITORIUM P 42

STATEMENT
The auditorium must have a tribune to allow for overview and sight lines during events.

CLARIFICATION
Deaf people are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. To explain: when deaf people walk into space they immediately 'read' the entire room to maintain control. Think of the movement of shadows or subtle changes in facial expressions and the positions of other people. They scan the environment and activities around them and see things that hearing people tend to overlook (Bauman, 2005). This is also called sensory reach. Meaning that the deaf and hard-of-hearing want to have a constant overview of a room. When events take place in the auditorium, this overview is especially important. Sight lines to a performance, for example, must not be blocked, as people will be unable to read lips or read facial expressions.

SOLUTION
The way to make this overview possible in the auditorium during events is to design a tribune. This tribune can also be used by pupils to hang out during breaks, while always maintaining an overview of the auditorium.

RELATION
P 26 staff room next to auditorium
P 41 auditorium with sight lines

SOURCE
(Bauman, 2005)
Fieldwork: interviews Kentalis College Zoetermeer

VIEW OF CLASSROOMS P 43

STATEMENT
To avoid distractions, classrooms must not face a playground.

CLARIFICATION
Deaf and hard-of-hearing pupils are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. The difference between the cognitive development of deaf and hard-of-hearing and hearing pupils is in the way this knowledge is conveyed through language (Gaudiot & Martins, 2018). The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision. It is with the eyes that the deaf and hard-of-hearing can 'hear'. Meaning that it is also with the eyes that the deaf and hard-of-hearing learn. They are for example taught in (partly) NGT, *Nederlandse Gebarentaal*. If the view from a classroom is focused on a playground, pupils are easily distracted. Their gaze goes to the window and not to the teacher, but since deaf and hard-of-hearing pupils learn and hear with their eyes, this will result in them missing the whole lesson.

SOLUTION
To avoid the distraction of looking outside, windows of classrooms must not face a playground.

RELATION
P 01 visual school
P 23 closed cupboards
P 44 clear school yard
P 57 no windows from floor to ceiling
P 61 silent ventilation
P 65 hallway and classroom floors separate
P 71 correct wall colours

SOURCE
(Gaudiot & Martins, 2018)
Fieldwork: interviews Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO and SO

CLEAR SCHOOL YARD P 44

STATEMENT
A clear school yard allows for sensory reach.

CLARIFICATION
Deaf people are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. To explain: when deaf people walk into space they immediately 'read' the entire room to maintain control. Think of the movement of shadows or subtle changes in facial expressions and the positions of other people. They scan the environment and activities around them and see things that hearing people tend to overlook (Bauman, 2005). This is also called sensory reach. This also applies to the school yard.

SOLUTION
Teachers and pupils must have a good overview and clear sight lines of the school yard. This ensures that accidents are prevented and that everyone can play safely.

RELATION
P 43 view of classroom

SOURCE
(Bauman, 2005)
Fieldwork: interviews Kentalis College Zoetermeer and Kentalis Guyot SO

GLASS IN DOORS P 45

STATEMENT
Doors must have glass in them to allow for sensory reach.

CLARIFICATION
Deaf people are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. To explain: when deaf people walk into space they immediately 'read' the entire room to maintain control. Think of the movement of shadows or subtle changes in facial expressions and the positions of other people. They scan the environment and activities around them and see things that hearing people tend to overlook (Bauman, 2005)
. This is also called sensory reach. When a door is solid, there is no overview. In such a case, the people on either side of the door can neither hear nor see someone coming.

SOLUTION
It is important that doors have a transparent section. This allows deaf people to see when someone is approaching. However, it is important that this glass part of the door is not distracting for pupils inside a classroom. For example, doors may only have a glass section at the top or side or may be made of frosted glass.

RELATION
P 40 sight lines in hallways
P 46 sliding doors
P 47 glass interior walls
P 48 transparent lifts
P 51 no corner walls

SOURCE
(Bauman, 2005)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries
Fieldwork: observations Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries

SLIDING DOORS P 46

STATEMENT
Entrance doors must be automatic glass sliding doors.

CLARIFICATION
When walking together in conversation deaf people tend to keep a wide distance from another for clear visual communication using sign language. During a conversation signers will also shift their gaze between the conversation and their surroundings keeping a close eye for hazards and maintaining proper direction (Bauman, 2005). If a door is closed one of the signers will have to open to door, meaning that that person has to stop signing.

SOLUTION
A school's entry doors must be automatic sliding doors, allowing signers to enter the building without having their conversation to be interrupted. Furthermore, the doors must be made out of glass in order to maintain sight lines.

RELATION
P 45 glass in doors

SOURCE
(Bauman, 2005)
Fieldwork: interviews Kentalis Compas College, Kentalis Guyot VSO and SO
Fieldwork: observations Kentalis Compas College, Kentalis Guyot VSO and SO

Figure 5. Patrick Glass. (2020, February 29). Interior glass wall installation Hampton University Harvey library [Photohraph]. Retrieved from https://patricksglass.com/envira/commercial-glass-install-gallery/interior-glass-wall-installation-hampton-university-harvey-library/

GLASS INTERIOR WALLS P 47

STATEMENT
Glass interior walls allow for sensory reach.

CLARIFICATION
Deaf people are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. To explain: when deaf people walk into space they immediately 'read' the entire room to maintain control. Think of the movement of shadows or subtle changes in facial expressions and the positions of other people. They scan the environment and activities around them and see things that hearing people tend to overlook (Bauman, 2005). This is also called sensory reach.

SOLUTION
With the use of glass interior walls sight lines and overview are created. Making a space even better for sensory reach.

RELATION
P 40 sight lines in hallways
P 45 glass in doors
P 48 transparent lifts
P 51 no corner walls

SOURCE
(Bauman, 2005)
Fieldwork: observations Kentalis Compas College

Figure 6. Gallaudet University. (n.d.-b). Transparent lifts SLCC [Photograph]. Retrieved from https://www.usgbc.org/articles/leed-and-deafspace-designing-community-architecture

TRANSPARENT LIFTS P 48

STATEMENT
Lifts must be transparent to allow for sensory reach.

CLARIFICATION
Deaf people are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. To explain: when deaf people walk into space they immediately 'read' the entire room to maintain control. Think of the movement of shadows or subtle changes in facial expressions and the positions of other people. They scan the environment and activities around them and see things that hearing people tend to overlook (Bauman, 2005). This is also called sensory reach. If a lift has solid walls, it means that there is no view from the lift to the outside and vice versa.

SOLUTION
When making a lift transparent, it allows for deaf people to see into space and 'read' the entire room to maintain control. It allows for sensory reach.

RELATION
P 40 sight lines in hallways
P 45 glass in doors
P 47 glass interior walls
P 51 no corner walls

SOURCE
(Bauman, 2005)

WIDE HALLWAYS P 49

STATEMENT
A school must have wide hallways to allow for accessibility and the continuation of conversations.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is referred to as CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). Among the CMB pupils there are often children in wheelchairs. If hallways are narrow, wheelchair users will have difficulty moving through it. Furthermore, when walking together in conversation deaf people tend to keep a wide distance from another for clear visual communication using sign language. During a conversation signers will also shift their gaze between the conversation and their surroundings keeping a close eye for hazards and maintaining proper direction (Bauman, 2005). A narrow hallway will not provide enough space for a signing conversation.

SOLUTION
In order to prevent problems for wheelchair users and people in signing conversation, a deaf school must have wide hallways.

RELATION
P 35 wheelchair parking area
P 36 enough storage space
P 40 sight lines in hallways
P 50 clear area for coats, desks and art
P 51 no corner walls
P 59 light hallways
P 67 clear walking routes

SOURCE
(Bauman, 2005)
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis Guyot VSO, SO and VSO Vries
Fieldwork: observation Kentalis College Zoetermeer, Kentalis Guyot VSO, SO and VSO Vries


HOUD
1.5
AFSTAND

CLEAR AREAS FOR COATS, DESKS AND ART P 50

STATEMENT
Hallways must have clear areas for coats, extra desks and art to allow for overview, signing conversation and sensory reach.

CLARIFICATION
When walking together in conversation deaf people tend to keep a wide distance from another for clear visual communication using sign language. During a conversation signers will also shift their gaze between the conversation and their surroundings keeping a close eye for hazards and maintaining proper direction. Furthermore, deaf people are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. To explain: when deaf people walk into space they immediately 'read' the entire room to maintain control. Think of the movement of shadows or subtle changes in facial expressions and the positions of other people. They scan the environment and activities around them and see things that hearing people tend to overlook (Bauman, 2005). This is also called sensory reach. Both of these principles do not work if a hallway is cluttered with coats, random placings of extra desks and art hung wherever.

SOLUTION
To keep the hallway free of hazards, it is important to have clearly marked areas for coats, extra desks and art. In this way, the hallway is clear, gives a good overview and there is enough space for a signing conversation.

RELATION
P 40 sight lines in hallways
P 49 wide hallways
P 67 clear walking routes

SOURCE
(Bauman, 2005)
Fieldwork: interviews Kentalis Guyot SO and VSO Vries
Fieldwork: observation Kentalis College Zoetermeer, Kentalis Guyot VSO, SO and VSO Vries

NO CORNER WALLS P 51

STATEMENT
To avoid collisions and provide an overview, a deaf school must not have any corner walls.

CLARIFICATION
When walking together in conversation deaf people tend to keep a wide distance from another for clear visual communication using sign language. During a conversation signers will also shift their gaze between the conversation and their surroundings keeping a close eye for hazards and maintaining proper direction (Bauman, 2005). A corner wall will keep a person approaching out of view, meaning that the signers will have to stop their conversation once they reach the corner to avoid bumping into each other. Where hearing people can adjust their walking route by being alerted by the sound of footsteps, deaf people are not able to.

SOLUTION
To avoid collisions and provide an overview, a deaf school must not have any corner walls. Signers will benefit from a curved wall to enable them to move through a space uninterrupted.

RELATION
P 40 sight lines in hallways
P 45 glass in doors
P 50 clear areas for coats, desks and art
P 47 glass interior walls
P 48 transparent lifts
P 67 clear walking routes

SOURCE
(Bauman, 2005)
Fieldwork: interviews Kentalis College Zoetermeer, Kentalis Guyot VSO and SO
Fieldwork: observations Kentalis College Zoetermeer, Kentalis Guyot VSO and SO

NO THRESHOLDS P 52

STATEMENT
A school must have no threshold to allow for accessibility and the continuation of conversations.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is referred to as CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). Among the CMB pupils there are often children in wheelchairs. If there are thresholds at school, wheelchair users will have difficulty entering rooms. Furthermore, when walking together in conversation deaf people tend to keep a wide distance from another for clear visual communication using sign language. During a conversation signers will also shift their gaze between the conversation and their surroundings keeping a close eye for hazards and maintaining proper direction. A threshold will be a hazard during a signing conversation.

SOLUTION
In order to prevent problems for wheelchair users and people in signing conversation, a deaf school must have no thresholds.

RELATION
P 09 deaf education is diverse
P 53 no unexpected steps
P 54 no stairs

SOURCE
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis College Zoetermeer and Kentalis Guyot VSO Vries
Fieldwork: observation Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries

Figure 7. Luuk Kramer. (2015, october 28).Steps Auditorium Kentalis College Zoetermeer [Photohraph]. Retrieved from https://architectenweb.nl/nieuws/artikel.aspx?ID=37784

NO UNEXPECTED STEPS P 53

STATEMENT
A school must have no unexpected steps to allow for accessibility and the continuation of conversations.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is referred to as CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). Among the CMB pupils there are often children in wheelchairs. If there are unexpected or unnecessary steps at school, wheelchair users will have difficulty entering rooms. Furthermore, when walking together in conversation deaf people tend to keep a wide distance from another for clear visual communication using sign language. During a conversation signers will also shift their gaze between the conversation and their surroundings keeping a close eye for hazards and maintaining proper direction. An unexpected step will be a hazard during a signing conversation.

SOLUTION
In order to prevent problems for wheelchair users and people in signing conversation, a deaf school must have no unexpected or unnecessary steps.

RELATION
P 09 deaf education is diverse
P 52 no thresholds
P 54 no stairs

SOURCE
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis College Zoetermeer and Kentalis Guyot VSO Vries
Fieldwork: observation Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries

NO STAIRS P 54

STATEMENT
A school must have no stairs to allow for accessibility and the continuation of conversations.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is referred to as CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). Among the CMB pupils there are often children in wheelchairs. If there are stairs at school, wheelchair users can not use them. Furthermore, when walking together in conversation deaf people will shift their gaze between the conversation and their surroundings keeping a close eye for hazards and maintaining proper direction (Bauman, 2005). Stairs will interrupt a conversation, since the signers will have to focus on the steps.

SOLUTION
In order to prevent problems for wheelchair users and to allow walking people to continue their signing conversation, a deaf school must have no stairs. A solution for this is the use of ramps and (glass) elevators.

RELATION
P 09 deaf education is diverse
P 52 no thresholds
P 54 no unexpected steps

SOURCE
(Bauman, 2005)
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis College Zoetermeer and Kentalis Guyot VSO Vries
Fieldwork: observation Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries


LOVE
TIKTOK

GOOD LIGHTING P 55

STATEMENT
A deaf school must have good lighting to allow for lip reading and reading facial expressions.

CLARIFICATION
A lack of proper lighting can lead to loss of concentration and even physical exhaustion. We have all experienced the situation where you cannot see your computer screen, positioned in front of the window, because of the sun and its glare. If we apply this to someone's face, the glare will make it impossible to read that person's face. Reading someone's facial expression and lips, however, is crucial while signing. A facial expression for example, can completely change a sentence or the meaning of a word. Lip reading is even more important, without it a signer cannot know which sign is being used (Bauman, 2005). Glare, shadows or backlighting can interrupt and distract from conversations and can make reading peoples facial expressions and lips difficult.

SOLUTION
To allow for easy lip reading and reading of facial expressions, the solution is controlled not to harsh (day)light to create a soft diffused light. Light from the side and from above so that faces are well-lit at all times for lip reading and reading facial expressions.

RELATION
P 56 additional lighting
P 58 no direct sunlight
P 59 light hallways

SOURCE
(Bauman, 2005)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries
Fieldwork: observations Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries

ADDITIONAL LIGHTING P 56

STATEMENT
A deaf school must have additional lighting that can be moved to allow for flexible use of spaces.

CLARIFICATION
A lack of proper lighting can lead to loss of concentration and even physical exhaustion. We have all experienced the situation where you cannot see your computer screen, positioned in front of the window, because of the sun and its glare. If we apply this to someone's face, the glare will make it impossible to read that person's face. Reading someone's facial expression and lips, however, is crucial while signing. A facial expression for example, can completely change a sentence or the meaning of a word. Lip reading is even more important, without it a signer cannot know which sign is being used (Bauman, 2005). Glare, shadows or backlighting can interrupt and distract from conversations and can make reading peoples facial expressions and lips difficult. Fixed lamps ensure that the lighting is in fixed positions. In this way, a classroom can only be organised based on the arrangement of these lamps. If an additional workplace is required in the classroom, it is important that this workplace, too, is well lit.

SOLUTION
In order to ensure that additional workplaces are well lit, the solution is to have separate lamps in the classroom. This ensures that classrooms can be used flexibly.

RELATION
P 17 extra desks
P 55 good lighting

SOURCE
(Bauman, 2005)
Fieldwork: interviews Kentalis Guyot VSO and SO

NO WINDOWS FROM FLOOR TO CEILING P 57

STATEMENT
Windows of classrooms must be 500 mm from the floor.

CLARIFICATION
Deaf and hard-of-hearing pupils are visual individuals with specific cognitive skills, who pay great attention to the perception of their surroundings. The difference between the cognitive development of deaf and hard-of-hearing and hearing pupils is in the way this knowledge is conveyed through language (Gaudiot & Martins, 2018). The world of a deaf and hard-of-hearing person is not of the hearing, but of the vision. It is with the eyes that the deaf and hard-of-hearing can 'hear'. Meaning that it is also with the eyes that the deaf and hard-of-hearing learn. They are for example taught in (partly) NGT, *Nederlandse Gebarentaal*. If the windows are from ceiling to floor, a window has a large surface area and therefore also a large view of the outside. Meaning that the windows will be of great distraction to pupils. Their gaze goes to the window and not to the teacher, but since deaf and hard-of-hearing pupils learn and hear with their eyes, this will result in them missing the whole lesson. Furthermore, windows with large openings cause a classroom to heat up more quickly.

SOLUTION
To avoid the distraction of looking outside, windows of classrooms must not be from floor to ceiling. Windows must be 500 mm from the floor, in order to still give pupils when seated an overview to outside, but not enough to be a distraction, while still giving enough natural light to a classroom.

RELATION
P 23 closed cupboards
P 43 view of classrooms
P 61 silent ventilation
P 65 hallway and classroom floors separate
P 71 correct wall colours

SOURCE
(Gaudiot & Martins, 2018)
Fieldwork: interviews Kentalis College Zoetermeer, Kentalis Guyot VSO and SO

NO DIRECT SUNLIGHT P 58

STATEMENT
Deaf schools must have little to now direct sunlight to allow for lip reading and reading facial expressions.

CLARIFICATION
A lack of proper lighting can lead to loss of concentration and even physical exhaustion. We have all experienced the situation where you cannot see your computer screen, positioned in front of the window, because of the sun and its glare. If we apply this to someone's face, the glare will make it impossible to read that person's face. Reading someone's facial expression and lips, however, is crucial while signing. A facial expression for example, can completely change a sentence or the meaning of a word. Lip reading is even more important, without it a signer cannot know which sign is being used. Looking specifically at sunlight, glare can interrupt and distract from conversations and can make reading peoples facial expressions and lips difficult (Bauman, 2005). During gym classes, glare can also make fellow pupils, basketballs, the teacher and therefore explanations, etc., impossible to see.

SOLUTION
To allow for easy lip reading, reading of facial expressions and clear views in the gymnasium, the solution is to have little to no direct sunlight at a deaf school.

RELATION
P 55 good lighting
P 59 light hallways

SOURCE
(Bauman, 2005)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer and Kentalis Guyot VSO
Fieldwork: observation Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO and SO


HOUD
1.5
AFSTAND

LIGHT HALLWAYS P 59

STATEMENT
Hallways of deaf schools must have good lighting to allow for lip reading and reading facial expressions.

CLARIFICATION
A lack of proper lighting can lead to loss of concentration and even physical exhaustion. We have all experienced the situation where you cannot see your computer screen, positioned in front of the window, because of the sun and its glare. If we apply this to someone's face, the glare will make it impossible to read that person's face. Reading someone's facial expression and lips, however, is crucial while signing. A facial expression for example, can completely change a sentence or the meaning of a word. Lip reading is even more important, without it a signer cannot know which sign is being used (Bauman, 2005). Glare, shadows or backlighting can interrupt and distract from conversations and can make reading peoples facial expressions and lips difficult . Looking specifically at hallways, signers already have to concentrate on both the conversation and their walking route. When the lighting conditions are poor, it means that they also have to focus more on each other's faces in order to see properly. A third element to focus on.

SOLUTION
To allow for easy lip reading and reading of facial expressions while walking and signing through a hallway, hallways need to have controlled (day)light to create a soft diffused light. Diffused light from above so that faces are well-lit at all times and no direct sunlight to reduce glare.

RELATION
P 55 good lighting
P 58 no direct sunlight

SOURCE
(Bauman, 2005)
Fieldwork: interviews Kentalis Guyot VSO and SO
Fieldwork: observation Dr. M. Polanoschool, Kentalis Compas College, Kentalis Guyot VSO and SO


taalhoek

GOOD ACOUSTICS P 60

STATEMENT
A deaf school must have good acoustics to avoid distractions and fatigue.

CLARIFICATION
A school for the deaf accommodates both deaf and hard-of-hearing pupils. In addition, some pupils have a hearing aid or a CI, *cochlear implant*. A cochlear implant sends sound signals to the auditory nerves and brain. Some hard-of-hearing and deaf people can hear sounds again with a CI. There is therefore a great difference in hearing levels in a deaf school (Kentalis, n.d.-c). Looking specifically at acoustics, it becomes apparent that when a room has bad acoustics, all sounds reverberate and echo. That is not just the sounds you want to hear, but also all the background noises. For hard-of-hearing people, this makes understanding speech much more difficult and also more tiring. After all, you have to make an extra effort to ignore background noise. A CI or a hearing aid picks up background noise, which distracts pupils. This leads to pupils not focusing on the teacher, or not focusing at all. Meaning that if a classroom has bad acoustics, pupils will be distracted.

SOLUTION
To avoid distractions and fatigue, it is important that a deaf school has good acoustics. The reverberation time must be low and there must be little background noise. Think of sound absorbing panels, stretching an acoustic cloth on the ceiling and the use of absorbent materials such as rock wool and curtains.

RELATION
P 61 silent ventilation
P 62 sound-absorbing panels
P 63 sound-absorbing panels in gymnasium
P 64 floors that allow vibrations
P 65 hallway and classrooms floors separate

SOURCE
(Kentalis, n.d.-c)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries
Fieldwork: observations Kentalis College Zoetermeer, Kentalis Guyot VSO, SO and VSO Vries
Research: Dutch deaf schools

SILENT VENTILATION P 61

STATEMENT
A school must have silent ventilation in order to not be a distraction to pupils.

CLARIFICATION
When it is too hot or stuffy in a classroom, windows are quickly opened. This poses a problem in deaf education: open windows create background noise and therefore distraction. In cases where there is ventilation to reduce heat, it often makes background noises, thus also being a distraction. A school for the deaf accommodates both deaf and hard-of-hearing pupils. In addition, some pupils have a hearing aid or a CI, *cochlear implant*. A cochlear implant sends sound signals to the auditory nerves and brain. Some hard-of-hearing and deaf people can hear sounds again with a CI. There is therefore a great difference in hearing levels in a deaf school (Kentalis, n.d.-c). However, a CI or hearing aid picks up background noise, which distracts pupils. This leads to pupils not focusing on the teacher, or not focusing at all. Meaning that if either windows are open or the ventilation is not silent, pupils will be distracted.

SOLUTION
To prevent a classroom or other space from heating up and having to open windows, there must be ventilation. It is however, crucial that this ventilation system is silent in order not to be a distraction to pupils with hearing aids or CI's.

RELATION
P 23 closed cupboards
P 43 view of classrooms
P 57 no windows from floor to ceiling
P 60 good acoustics
P 65 hallway and classrooms floors separate

SOURCE
(Kentalis, n.d.-c)
Fieldwork: interviews Dr. M. Polanoschool, Kentalis College Zoetermeer and Kentalis Compas College


taalhoek

SOUND-ABSORBING PANELS P 62

STATEMENT
In order to reduce reverberation and background noise, there must be sound-absorbing panels.

CLARIFICATION
A school for the deaf accommodates both deaf and hard-of-hearing pupils. In addition, some pupils have a hearing aid or a CI, *cochlear implant*. A cochlear implant sends sound signals to the auditory nerves and brain. Some hard-of-hearing and deaf people can hear sounds again with a CI. There is therefore a great difference in hearing levels (Kentalis, n.d.-c). However, a CI or hearing aid picks up background noise and reverberation, which distracts pupils. This leads to pupils not focusing on the teacher, or not focusing at all.

SOLUTION
In order to reduce background noise and reverberation, sound-absorbing panels must be installed in classrooms and the gymnasium. This will benefit the concentration of pupils.

RELATION
P 60 good acoustics
P 63 sound-absorbing panels in gymnasium

SOURCE
(Kentalis, n.d.-c)
Fieldwork: interviews Kentalis Guyot VSO and SO

SOUND-ABSORBING WALLS AND FLOORS IN GYMNASIUM P 63

STATEMENT
In order to reduce reverberation and background noise in the gymnasium, there must be sound-absorbing walls and floors.

CLARIFICATION
A school for the deaf accommodates both deaf and hard-of-hearing pupils. In addition, some pupils have a hearing aid or a CI, *cochlear implant*. A cochlear implant sends sound signals to the auditory nerves and brain. Some hard-of-hearing and deaf people can hear sounds again with a CI. There is therefore a great difference in hearing levels (Kentalis, n.d.-c). However, a CI or hearing aid picks up background noise and reverberation, which distracts pupils. Looking specifically at gym classes at a deaf school, loud background noise and reverberation, leads to pupils not focusing on their activity or explanation of the teachers. In addition, constant reverberation and loud background noise can also have negative effects on pupils' health and mood (Akoesta, n.d.).

SOLUTION
In order to reduce background noise and reverberation, sound-absorbing walls and floor must be installed in classrooms and the gymnasium. This will benefit the concentration, health and moods of pupils. Think for example of materials with a high acoustic value such as rock wool and fabrics.

RELATION
P 60 good acoustics
P 62 sound-absorbing panels

SOURCE
(Akoesta, n.d.)
(Kentalis, n.d.-c)
Fieldwork: interviews Kentalis College Zoetermeer and Kentalis Guyot SO
Fieldwork: observations Kentalis College Zoetermeer, Kentalis Guyot VSO and SO


BUITEN
SLUITEN

FLOORS THAT ALLOW VIBRATIONS P 64

STATEMENT
The floors of a deaf school must allow vibrations in order to be use of for the heightened tactile senses of the deaf.

CLARIFICATION
Deaf and hard-of-hearing people compensate for their hearing loss through extraordinary sensory *"super powers"* (Holmes, 2017, p.181). One of these *"super powers"* of the deaf and hard-of-hearing is heightened tactile senses. They can 'hear' sound by feeling vibrations (Napoli, 2014, p.222). This means, among other things, that the deaf and hard-of-hearing can feel vibrations from footsteps. This feeling of vibrations can also be used to attract each other's attention. In schools this can, for example, be used to know that someone is walking behind you. Furthermore, a teacher can use this feeling of vibrations to get the attention of pupils during a lesson. If a pupil is distracted, a teacher can simply stamp on the floor.

SOLUTION
In order to make use of the sensory *"super power"* heightened tactile senses, it is important that the floor constructions of a deaf school are made of a material that allows vibrations. This is equally important for the floor's finishing layer. Think of materials such as steel and concrete.

RELATION
P 60 good acoustics
P 65 hallway and classroom floors separate

SOURCE
(Holmes, 2017, p.181)
(Napoli, 2014, p.222)
Fieldwork: interviews Kentalis College Zoetermeer

HALLWAY AND CLASSROOM FLOORS SEPARATE P 65

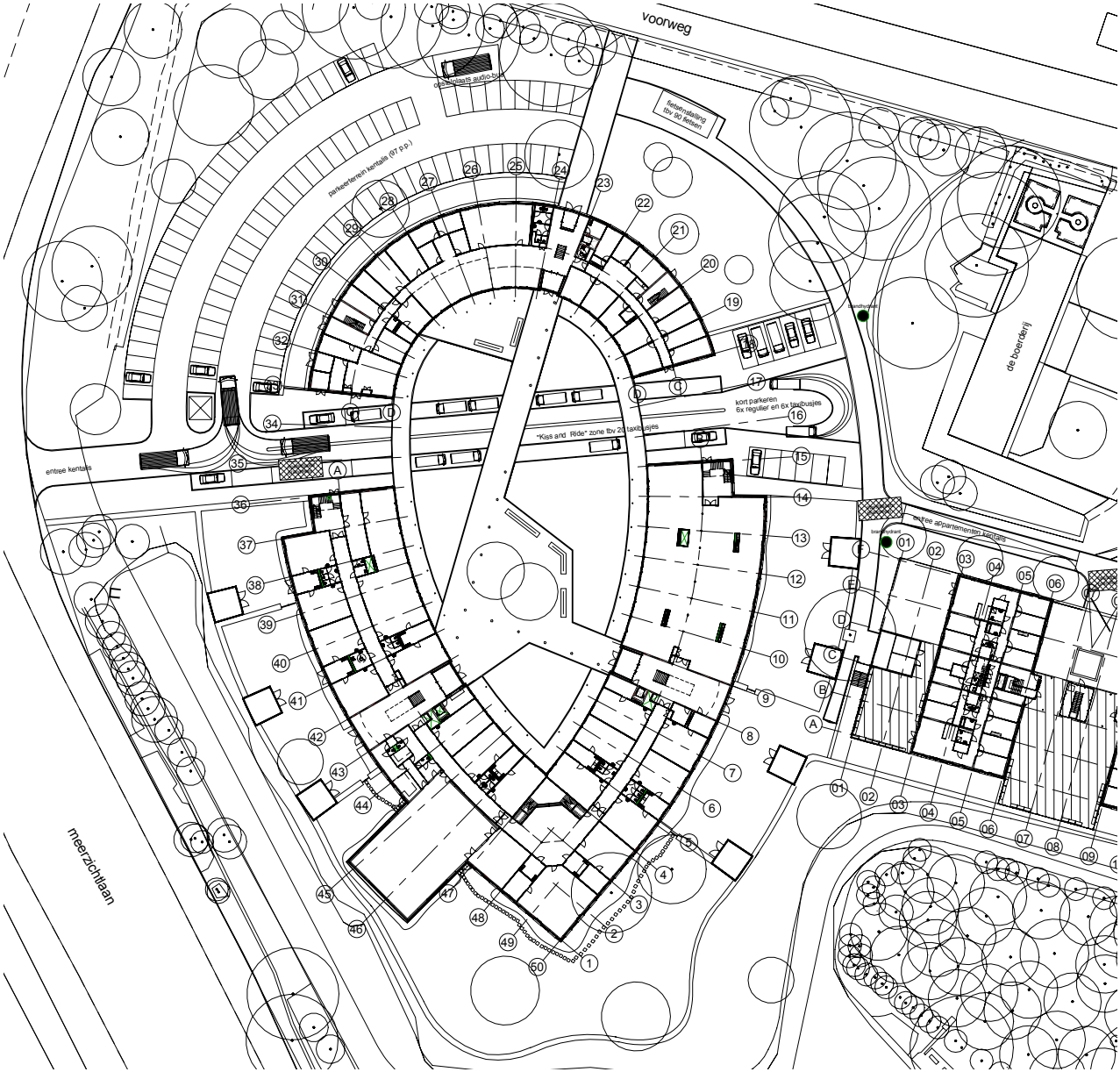
STATEMENT
To prevent vibration, the hallway and classroom floors must be separate from each other in the construction.

CLARIFICATION
Deaf and hard-of-hearing people compensate for their hearing loss through extraordinary sensory *"super powers"* (Holmes, 2017, p.181). One of these *"super powers"* of the deaf and hard-of-hearing is heightened tactile senses. They can 'hear' sound by feeling vibrations (Napoli, 2014, p.222). This means, among other things, that the deaf and hard-of-hearing can feel vibrations from footsteps. At school, this means that footsteps can be felt in hallways and classrooms. When the floors of the two are connected in the construction, this means that the vibrations of footsteps in the hallway can be felt in the classrooms. This can be very distracting for pupils. This leads to pupils having difficulty focusing on the teacher, or not able to focus at all.

SOLUTION
In order to prevent vibration from footsteps in the hallway and thus distraction, it is important that the floors of the hallways and classrooms are separate from each other in the construction.

RELATION
P 13 listen to the deaf and hard-of-hearing
P 23 closed cupboards
P 43 view of classrooms
P 57 no windows from floor to ceiling
P 60 good acoustics
P 64 floors that allow vibrations
P 71 correct wall colours

SOURCE
(Holmes, 2017, p.181)
(Napoli, 2014, p.222)
Fieldwork: interviews Kentalis College Zoetermeer


voorweg
parkeerterrein kentalis (87 p.p.)
opstelplaats audio-bus
fietsenstalling tbv 90 fietsen
de boerderij
kort parkeren
6x reguliер en 6x taxibusjes
"Kiss and Ride" zone tbv 20 taxibusjes
entree kentalis
entree appartementen kentalis
meerzichtlaan

CLEAR LAYOUT P 66

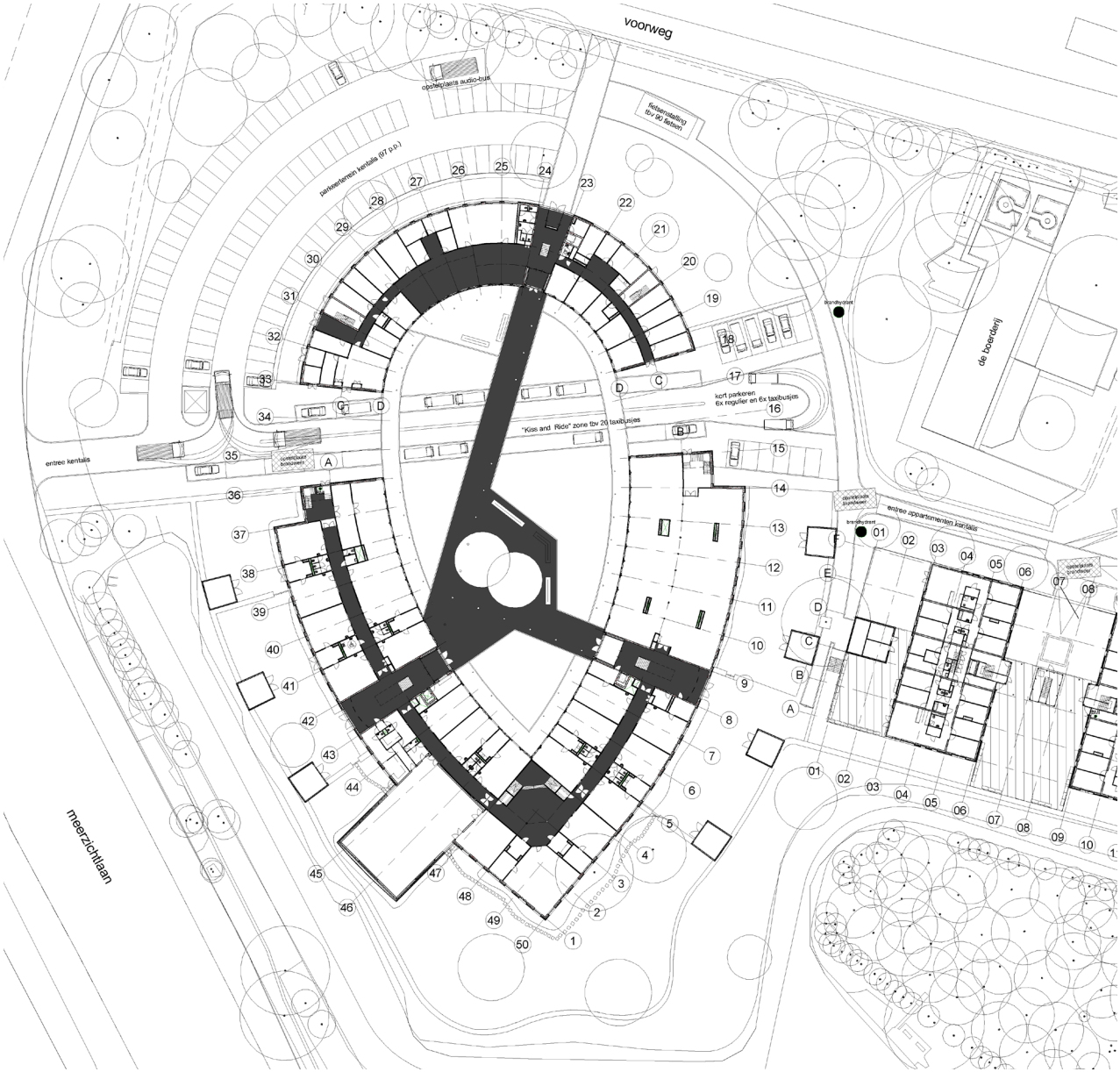
STATEMENT
The layout of the school must be easy to understand for all pupils.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is also called CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). To be precise, two types of education are distinguished in deaf schools: CMB and DSH, *doof en slechthorend*. Schools can be difficult for CMB pupils with intellectual disabilities to follow and understand. They do not always know where to go and get lost.

SOLUTION
The layout of the school must be easy to understand for all pupils. This can be achieved by logical grouping. For example, the auditorium must be centred, the school's additional functions placed together and the upper and lower grades separated.

RELATION
P 67 clear walking routes
P 68 walking lines

SOURCE
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis College Zoetermeer, Kentalis Compas College and Kentalis Guyot SO
Fieldwork: observations Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO and SO


voorweg
opstelplaats audio-bus
fietsenstalling tbv 97 fietsen
parkeerterrein kentalis (97 p.p.)
de boerderij
brandhydrant
kort parkeren
6x regulier en 6x taxibusjes
"Kiss and Ride" zone tbv 20 taxibusjes
entree kentalis
entree appartementen kentalis
meerzichtlaan

CLEAR WALKING ROUTES P 67

STATEMENT
Walking routes must be clear to allow for pupils to have a signing conversation while walking.

CLARIFICATION
When walking together in conversation deaf people tend to keep a wide distance from another for clear visual communication using sign language. During a conversation signers will also shift their gaze between the conversation and their surroundings keeping a close eye for hazards and maintaining proper direction (Bauman, 2005). If a walking route is unclear, pupils will have to focus on which way to go instead of their signing conversation.

SOLUTION
Walking routes must be clear so that pupils do not have to focus on the route, but can focus on their conversation. This is achieved by wide hallways, sight lines to other areas or hallways, overview and good lighting.

RELATION
P 40 sight lines in hallways
P 49 wide hallways
P 50 clear area for coats, desks and art
P 51 no corner walls
P 66 clear layout
P 68 walking lines
P 69 colours on the road

SOURCE
(Bauman, 2005)
Fieldwork: interviews Kentalis College Zoetermeer and Kentalis Guyot SO
Fieldwork: observations Kentalis College Zoetermeer, Kentalis Guyot VSO and SO

WALKING LINES P 68

STATEMENT
Walking routes must be clear and not cause confusion for pupils.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is also called CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). To be precise, two types of education are distinguished in deaf schools: CMB and DSH, *doof en slechthorend* (Kentalis, n.d.-a). Schools often consist of a network of hallways. This network can be difficult for CMB pupils with intellectual disabilities to follow and understand. They do not always know where to go because of the many hallways and get lost.

SOLUTION
Walking routes can be made clear by means of lines on the ground. In this way, children can follow lines to the toilets, for example.

RELATIONs
P 66 clear layout
P 67 clear walking route
P 69 colours on the road

SOURCE
(Kentalis, n.d.-a)
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis Guyot SO

COLOURS ON THE ROAD P 69

STATEMENT
Use colours on the road to allow for safe situations.

CLARIFICATION
The pupils of a deaf school cannot hear the traffic when they are outside. This can lead to accidents. Especially for CMB pupils with intellectual disabilities, it is sometimes difficult to know where they can or cannot walk safely (Kentalis, n.d.-b). Especially at the beginning and end of the day, with the many taxis that bring and pick up pupils, this can lead to dangerous situations.

SOLUTION
In order to make for safe situations, mark the kiss & ride, the car lane, cycle lane and parking areas with colours on the road.

RELATION
P 01 visual school
P 09 deaf education is diverse
P 37 kiss & ride
P 67 clear walking routes
P 68 walking lines

SOURCE
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis College Zoetermeer

Figure 8. ABS West. (n.d.). Wall railings [Photohraph]. Retrieved from https://www.abswest.com.au/index.php/products/wall-door-protection/crash-rails/

RAILINGS ON WALLS P 70

STATEMENT
Hallways must have railings on the walls to support pupils when walking.

CLARIFICATION
Deaf schools often have children who, in addition to an auditory restriction, also have other disabilities. This is referred to as CMB education, *communicatief meervoudige beperking* (Kentalis, n.d.-b). To be precise, two types of education are distinguished in deaf schools: CMB and DSH, *doof en slechthorend*. Among the CMB pupils there are often children with a physical restriction. These pupils often have difficulty walking.

SOLUTION
To make walking through hallways convenient for all pupils, it is important to have railings on the walls. Pupils with physical disabilities can use railings to move around the school hallways without any problems.

RELATION
P 09 deaf education is diverse

SOURCE
(Kentalis, n.d.-b)
Fieldwork: interviews Kentalis Guyot VSO Vries


lichtgrijs PG 105
lichtblauw PM 430
04511
bamboo
RAL 5004
lichtblauw
RAL 9016
RAL 9002
RAL 7035
S 6020-R90B
S 3020-B10G
S 3010-B30G

CORRECT WALL COLOURS P 71

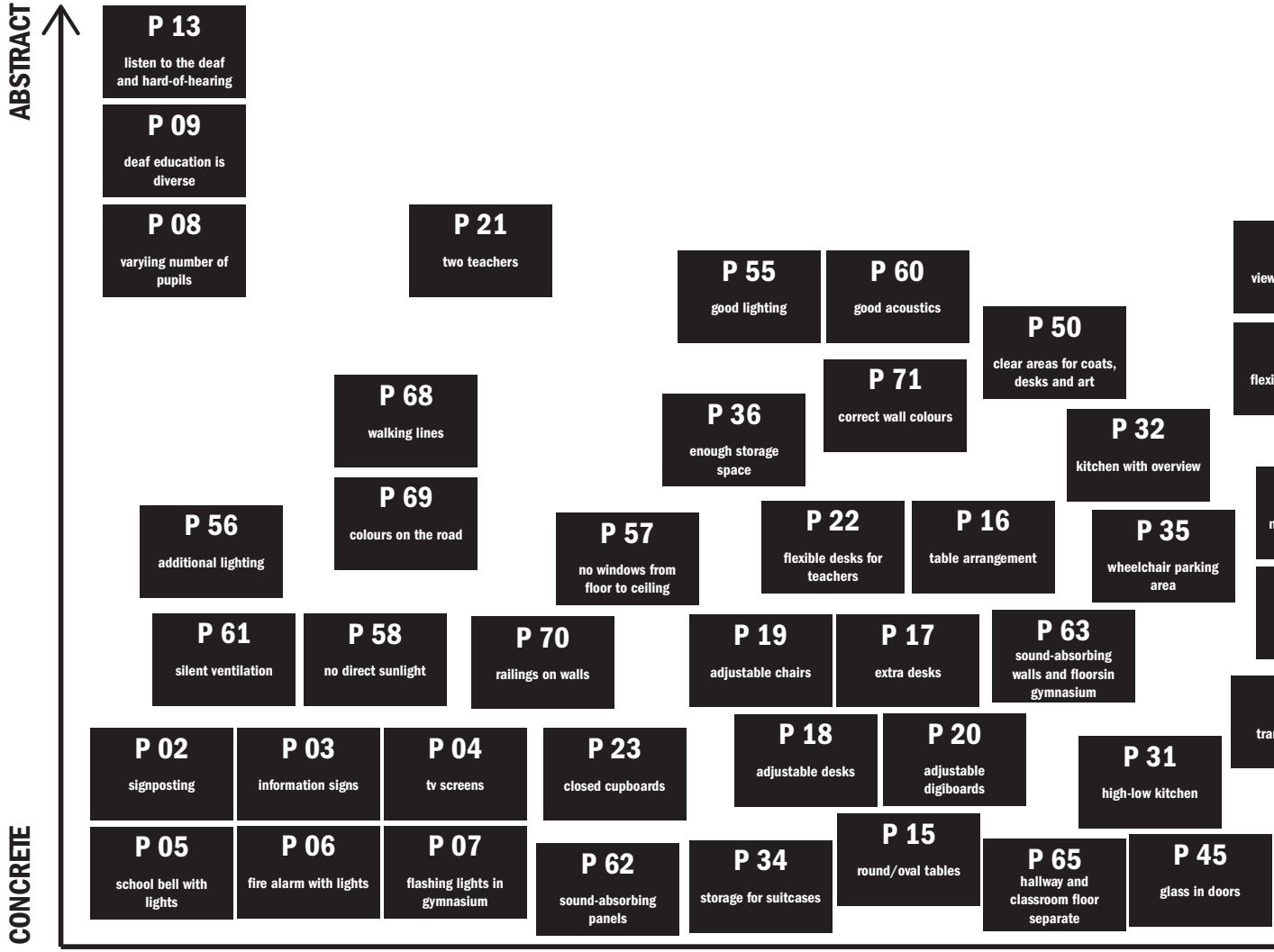
STATEMENT
Wall colours must contrast with skin colours.

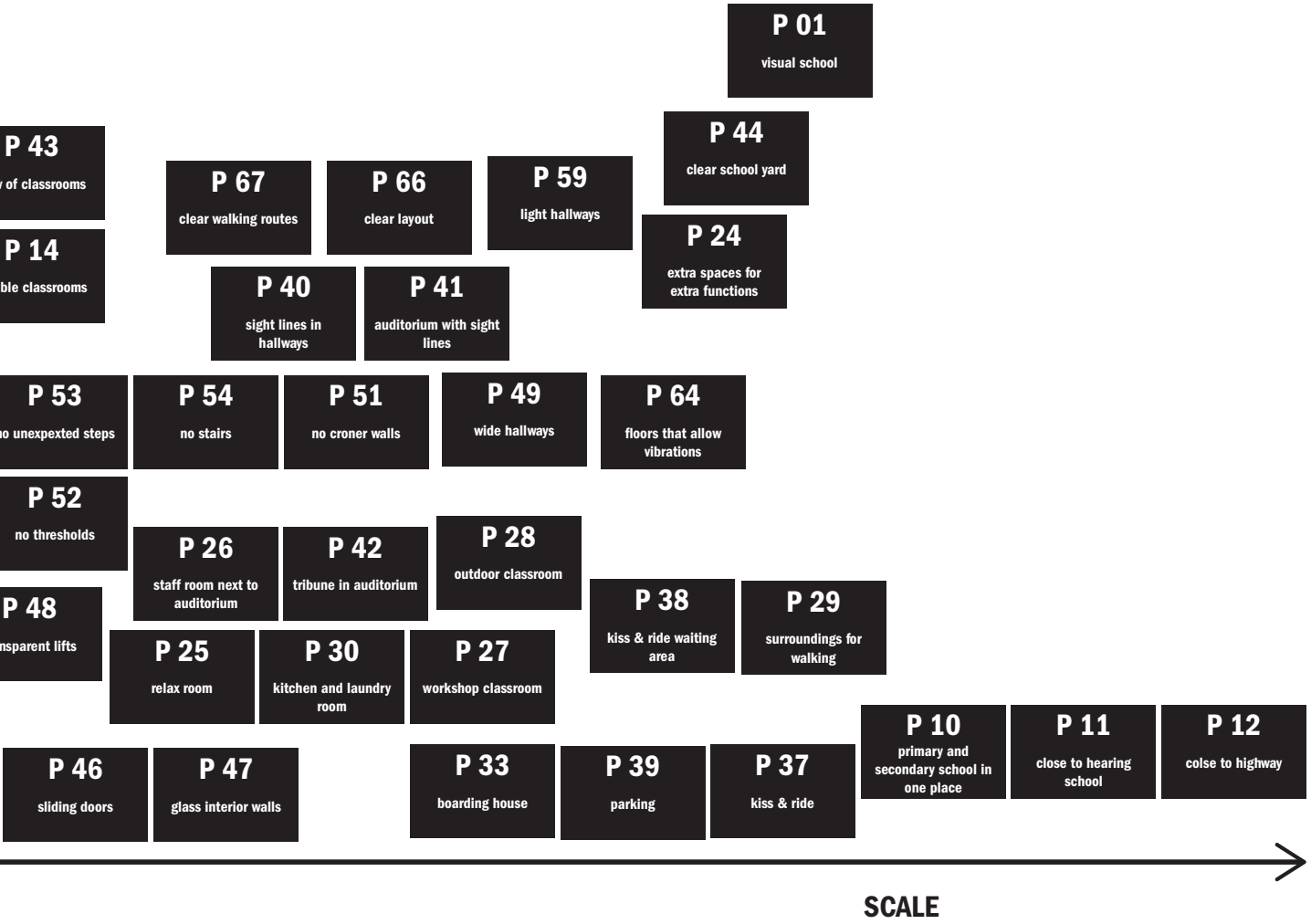
CLARIFICATION
Reading someone's facial expression and lips is crucial while signing. A facial expression for example, can completely change a sentence or the meaning of a word. Lip-reading is even more important, without it a signer cannot know which sign is being used. Wall colours that are similar to a person's skin tone, can interrupt and distract from conversations and can make reading peoples facial expressions and lips difficult (Bauman, 2005).

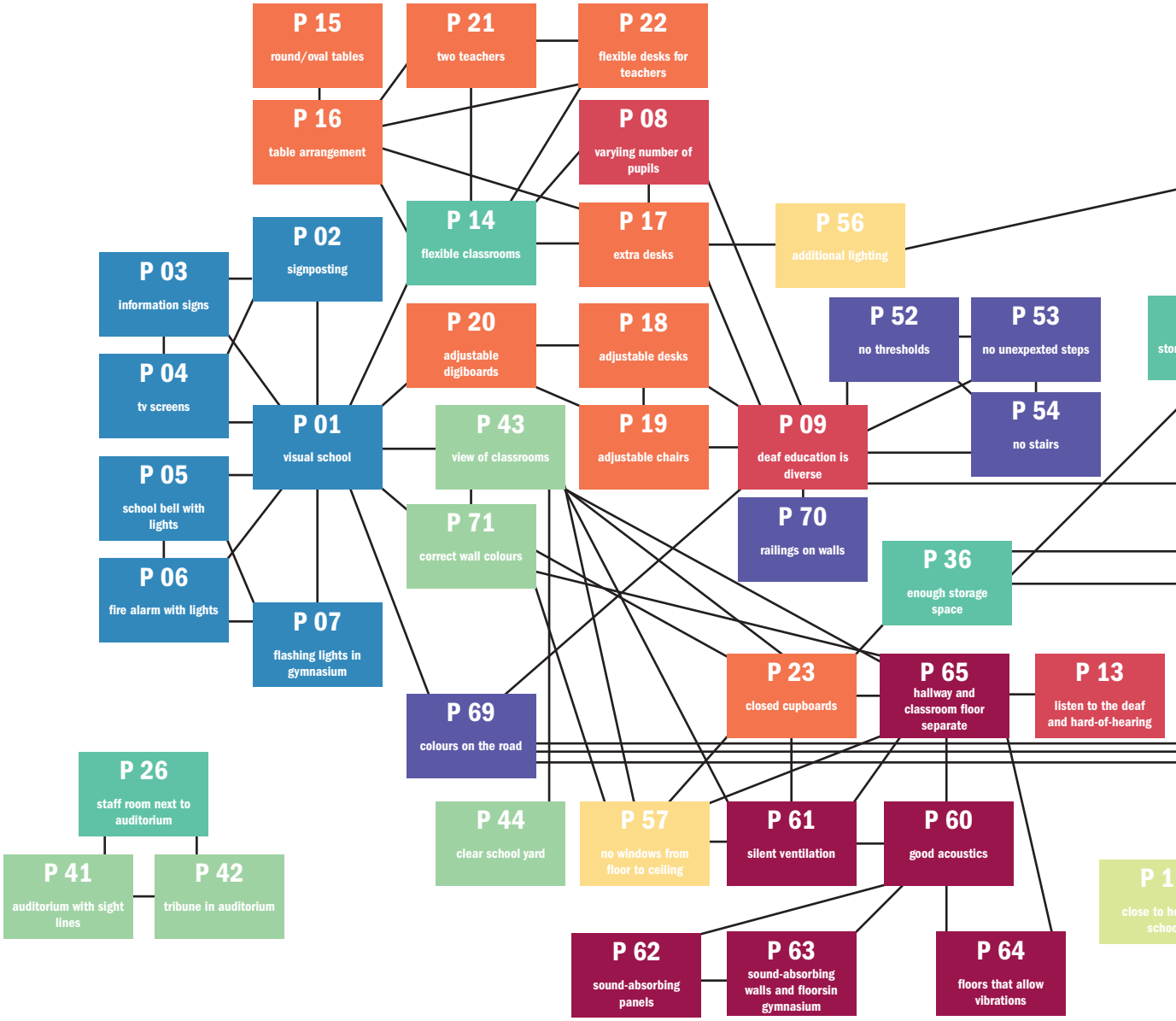
SOLUTION
Wall colours must contrast a range of skin tones. Think of colours such as muted greens or blues.

RELATION
P 01 visual school
P 23 closed cupboards
P 43 view of classrooms
P 57 no windows from floor to ceiling

SOURCE
(Bauman, 2005)
Fieldwork: interviews Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries
Fieldwork: observation Kentalis College Zoetermeer, Kentalis Compas College, Kentalis Guyot VSO, SO and VSO Vries


ABSTRACT
CONCREIE
P 13
listen to the deaf and hard-of-hearing
P 09
deaf education is diverse
P 08
varyiing number of pupils
P 21
two teachers
P 55
good lighting
P 60
good acoustics
P 50
clear areas for coats, desks and art
P 71
correct wall colours
P 68
walking lines
P 36
enough storage space
P 32
kitchen with overview
P 69
colours on the road
P 56
additional lighting
P 57
no windows from floor to ceiling
P 22
flexible desks for teachers
P 16
table arrangement
P 35
wheelchair parking area
P 61
silent ventilation
P 58
no direct sunlight
P 70
railings on walls
P 19
adjustable chairs
P 17
extra desks
P 63
sound-absorbing walls and floorsin gymnasium
P 02
signposting
P 03
information signs
P 04
tv screens
P 23
closed cupboards
P 18
adjustable desks
P 20
adjustable digiboards
P 31
high-low kitchen
P 05
school bell with lights
P 06
fire alarm with lights
P 07
flashing lights in gymnasium
P 62
sound-absorbing panels
P 34
storage for suitcases
P 15
round/oval tables
P 65
hallway and classroom floor separate
P 45
glass in doors


P 01
visual school
P 43
of classrooms
P 44
clear school yard
P 67
clear walking routes
P 66
clear layout
P 59
light hallways
P 14
ble classrooms
P 24
extra spaces for extra functions
P 40
sight lines in hallways
P 41
auditorium with sight lines
P 53
o unexpexted steps
P 54
no stairs
P 51
no croner walls
P 49
wide hallways
P 64
floors that allow vibrations
P 52
no thresholds
P 26
staff room next to auditorium
P 42
tribune in auditorium
P 28
outdoor classroom
P 48
nsparent lifts
P 38
kiss & ride waiting area
P 29
surroundings for walking
P 25
relax room
P 30
kitchen and laundry room
P 27
workshop classroom
P 10
primary and secondary school in one place
P 11
close to hearing school
P 12
colse to highway
P 46
sliding doors
P 47
glass interior walls
P 33
boarding house
P 39
parking
P 37
kiss & ride
SCALE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P 22
flexible desks for teachers
P 16
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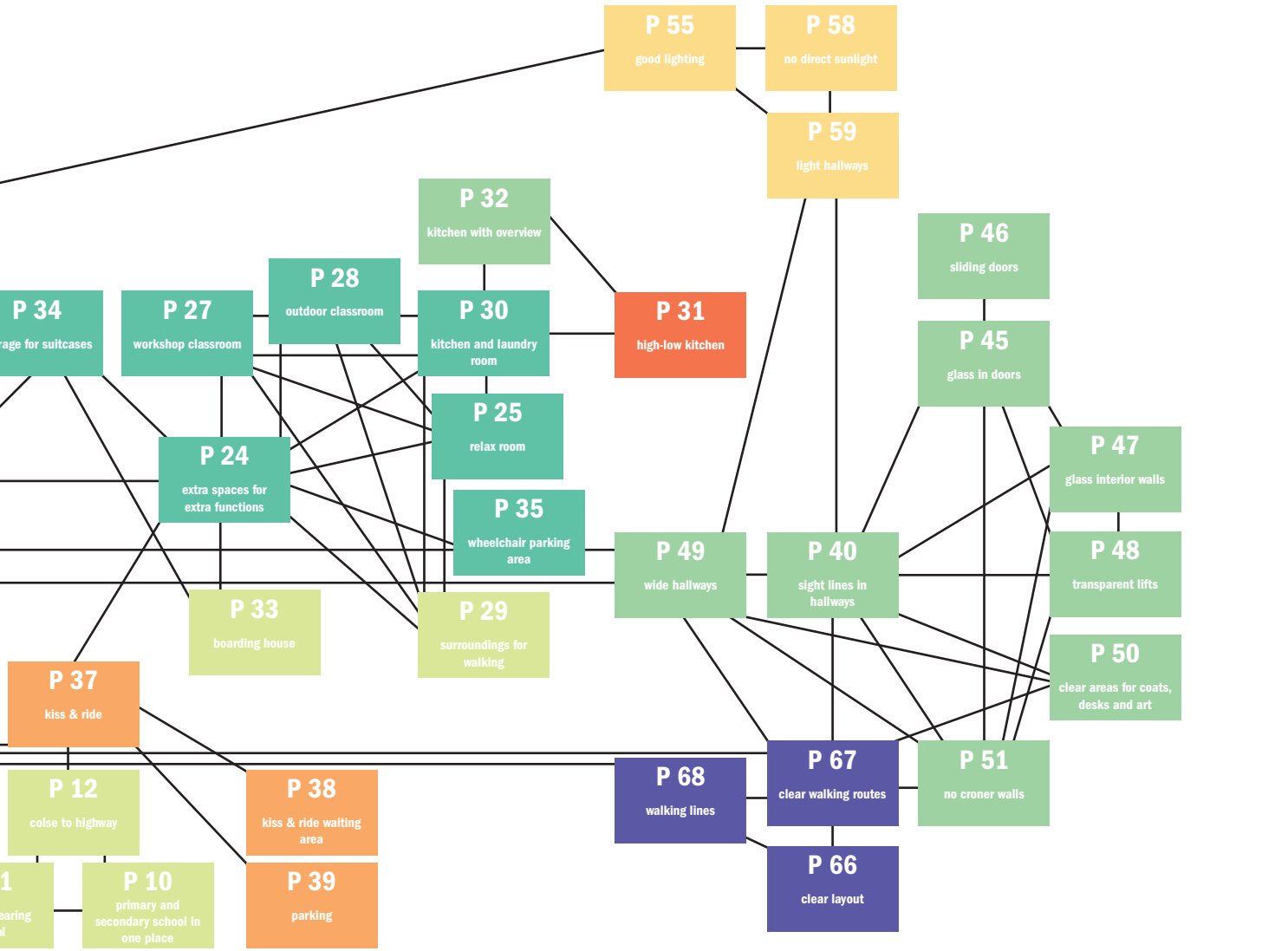
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P 10
primary and secondary school in one place
P 39
parking
P 66
clear layout
acoustics
advice
furniture
kiss & ride
lighting
location
sight lines & overview
spaces
visual school
walking route

EPILOGUE

CONCLUSION

It can now be concluded that the built environment has to change and be more inclusive. Deaf and hard-of-hearing pupils are visual individuals and the design of a deaf school must be based on that aspect. Within this research the research questions asked focussed on how to make this change happen, and how to design a deaf school, by means of the following question: *How to design an appropriate school for the deaf and hard-of-hearing?* To help answers the main question the following sub questions were asked:

1. *What are the problems deaf and hard-of-hearing people can encounter in daily live?*
2. *What are ingredients for a PvE that can be abstracted from good and bad examples of schools for the deaf and hard-of-hearing?*
3. *How to translate social and behaviour requirements into design guidelines?*

Findings of the sub question *What are the problems deaf and hard-of-hearing people can encounter in daily live?* have been implemented in the pattern language. Each pattern in itself describes a problem that the deaf and hard-of-hearing experience in their daily lives. The pattern language therefore serves as an answer to the sub question. Furthermore, the findings of the sub question *What are ingredients for a PvE that can be abstracted from good and bad examples of schools for the deaf and hard-of-hearing?* are also reflected in the pattern language. The school visits function as the good and bad examples to learn from and these findings have been incorporated into the patterns. From the pattern language, the ingredients for a PvE then emerge. Additionally, the pattern language was also used to answer the third sub question *How to translate social and behaviour requirements into design guidelines?*. The way in which the social and behaviour requirements are incorporated into design guidelines is to draw up the pattern language.

Finally, it can be stated that by means of the answering of the sub questions, the main question was answered. The answer to the question on *how to design an appropriate school for the deaf and hard-of-hearing?* is the pattern language. The guidelines from the pattern language function as a hand book and inspiration on how to design an appropriate school for the deaf and hard-of-hearing. It can therefore be concluded that research questions have been answered on the basis of the established pattern language.

REFLECTION P2

SCHOOL VISITS

Looking back on the research process, two things can be concluded. One of these is the school visits. My request to schools to make a visit was received not only well, but also enthusiastically. More so than I had expected. All the schools that showed interest in cooperating in my research, I visited with pleasure and enthusiasm. However, during the visit it became apparent that by visit number four, saturation had set in: I gained little new data. However, this saturation effect told me that my findings were correct, which provided a welcome confirmation for my research.

To elaborate on the schools' reactions, it was remarkable to see how happy they were to collaborate in my research. Schools took it into their own hands to make the best possible planning for me during my visit. Every detail was arranged for me: which lessons I could observe and who I could interview. I am aware that this enthusiasm and the openness of the schools contributed greatly to the success of my research.

PROCESS

Finally, it is important to reflect on my process. At an early stage in the research, I contacted several deaf schools. Approaching them early and having good contact with the schools has ensured that I was able to visit schools very early in my process. Some visits already took place when I was still exploring what my research would entail. However, the early visits helped me a lot. The information I gained from the visits pushed me in the right direction. For example, the early school visits gave me a list of requirements for a location for the design part. Looking back, I have to conclude that the many e-mail contacts, the school visits throughout the Netherlands and the analyses afterwards took up a lot of my time. This was certainly all necessary for my research, but it all took time away from my design part. For future reference, it is important that this balance is better.

REFLECTION P4

RESEARCH

The following was stated at the beginning of this research: *it should be mentioned the patterns that have been drawn up in this book were not finished. These patterns were drawn up during the research part of the graduation by means of fieldwork and literature. When the second part of the graduation starts, the design, this will have influence on the patterns. It is only during the designing that the patterns mentioned in this book can be tested. It may be that patterns have to be adjusted, that patterns are removed or that new patterns are added. After the design process, there will therefore most likely be a new version of this book. In this version it will be clearly mentioned whether a pattern comes from research, design or that a pattern has been adjusted.* Now that the design is as good as completed, I can look back on my design process and use of my research in that design process. It turned out that the pattern language I created supported me quite well in designing the deaf school. I was able to pick out and use the patterns that were important to me to arrive at the design of the school. And I did not have to adapt these patterns because it turned out that they already worked very well. The descriptions clearly let me know how to apply a pattern and from the icons, I had a good idea of what the impact would be. Therefore, no new version of this study is needed.

EXPECTATIONS

Something I noticed as my design progressed is a certain expectation that a studio like Explorelab carries, in my opinion. With that expectation, I refer to the fact that the design you create or the research you do should or will be groundbreaking. At least in my eyes, it feels that way. You have to make a certain discovery because you are part of a studio where you graduate with your own chosen topic related to a personal fascination. Especially within my own subject, designing a school for the deaf, I very much felt that pressure to design something, for lack of a better word, revolutionary. While in reality, my goal for this graduate subject has never been to design something groundbreaking, to graduate cum laude or to win the Archiprix. My goal has always been to identify the problems in the architecture of deaf education and find a possible solution to the problem. My end goal, even if it is only a little, has always been to help make the built environment and specifically in my research and design, a school, a better and more pleasant place for the deaf and hard-of-hearing.

STUBBORNNESS

There is also something personal that I want to address in this reflection and that concerns my own stubbornness and cross-headedness. Quite early in my design process, I made the choice not to use brick. The reason for this was the overuse of this in the surrounding neighbourhoods of my location. All houses have the same brick look which made the neighbourhoods bland and uniform. My position in this was therefore to make the design for the deaf school stand out from this and hence not use brick. To this I committed myself very rigorously. That is exactly where my stubbornness comes in. I am very good at holding myself to that kind of commitment. Even so much so that I refused to admit that my chosen (second) facade finish did not work. I was told by several friends and teachers that perhaps I should try using brick. But I refused to listen because I did not want to go with the uniformity of the brick neighbourhoods. But does using brick then make the design for the deaf school part of that uniformity? No. The school can still be a unique stand-alone building and at the same time fit right in with the neighbourhoods, something that in turn makes the design even much stronger. Fortunately, I caught myself on this stubbornness two weeks before the P4, so I finally did decide to use bricks. And the moment I saw the effect the brick had on the design, I immediately knew: yes, this is it. But it certainly would have saved me a lot of time if I had realised this earlier.

WHAT MAKES A DEAF SCHOOL?

Another recurring topic throughout my design was the question: what makes the design a deaf school and not a hearing school? My answer to that question is that the design is not necessarily a new design. But where a deaf school differs from a hearing school is in the way it is designed. A deaf school is an assemblage of individual (design) elements that are not new in themselves, but their combination is. Those individual (design) elements are all the patterns formed in this book, and for each deaf school, a number of these patterns can form a new combination to make the ideal deaf school. I like to think of it as cooking: no new ingredients are being discovered, but a new recipe.

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APPENDIX I

INTERVIEW QUESTIONS PUPILS

START

1a) What is your name?
1b) How old are you?
1c) Are you deaf/ hard-of-hearing?
1d) From birth or later?
1e) Do you have to travel far for your school?
1f) Which means of transport do you use to get to school?
1g) Do other pupils live far from school?
1h) Do any other pupils live far away or close by?

SCHOOL

2a) Is there a place at school you like to go with friends?
2b) Is there a place at school you like to go to relax/concentrate?
2c) How do you relax?
2d) What do you need to relax/concentrate?
2e) Are there places at school where you experience stress?
2f) Are there things that could be better in the school building?
2g) What works well in the building?
2h) Is there anything you miss at school?

CLASSROOM

3a) Does the shape of the classroom affect the way you are taught?
3b) Does the layout of the classroom affect the way you are taught?
3c) Does the layout of the classroom affect you?
3c) Does the classroom layout affect other pupils?
3d) Is there a particular table arrangement that helps you pay attention?
3e) Is there a particular table arrangement that helps you to concentrate?
3f) What are some important elements for you in a classroom?

3g) Are there elements in a classroom that do not work/disturb during the lesson?
3h) Are there any elements of the classroom that you miss?
3i) What could be better in the classroom?
3j) What works well?
3k) Are you bothered by background noise during the lesson?
3l) Are there any distractions in the classroom?

HALLWAY

4a) How do you walk through a hallway?
4b) Do you concentrate on certain aspects?
4c) What are some important points you concentrate on?
4d) Do you pay much attention to your surroundings?
4e) Can you show me your walking route(s) of a day?

AUDITORIUM

5a) What is it like for you to walk through the auditorium?
5b) Do you concentrate on certain aspects?
5c) What are some important points you concentrate on?
5d) Do you pay much attention to the surroundings?

SCHOOL YARD

6a) What is it like for you to walk across the school yard?
6b) Do you concentrate on certain aspects?
6c) What are some important points you concentrate on?
6d) Do you pay much attention to the surroundings?
6e) How do you play on the square?

FINAL

7a) If you had all the money in the world and you could design a deaf school yourself, what would you want in your school?
7b) Or what do you think is the most important thing to have in the school building?
7c) Do you have any tips for me?

INTERVIEW QUESTIONS TEACHERS

START

1a) What is your name?
1b) Are you deaf/hard-of-hearing?
1c) From birth or later?

SCHOOL

2a) Is there a place at school pupils like to go to with friends?
2b) Is there a place at school pupils like to go to relax/concentrate?
2c) How do pupils relax?
2d) What do pupils need to relax/concentrate?
2e) Are there places in the school where pupils experience stress?
2f) Are there things that could be better in the school building?
2g) What works well in the building?
2h) Is there anything missing at school?

CLASSROOM

3a) Does the shape of the classroom influence the way you teach?
3b) Does the layout of the classroom affect the way you teach?
3c) Does the layout of the classroom affect you?
3c) Does the classroom layout affect pupils?
3d) Is there a particular table arrangement that makes you teach better?
3e) Is there a particular table arrangement that helps pupils to concentrate?
3f) What are some important elements for you in a classroom?
3g) Are there elements in a classroom that do not work/disrupt the lesson?
3h) Are there any elements of a classroom that you miss?
3i) What could be better in the classroom?
3j) What works well?
3k) Is background noise a problem during teaching?

3l) Are there any distractions in the classroom?

HALLWAY

3a) How do you walk through a hallway?
3b) Do you concentrate on certain aspects?
3c) What are some important points you concentrate on?
3d) Do you pay much attention to your surroundings?
3e) Can you show me your walking route(s) of a day?

AUDITORIUM

4a) How do you walk through the auditorium?
4b) Do you concentrate on any particular aspects?
4c) What are some important points you concentrate on?
4d) Do you pay much attention to the surroundings?

SCHOOL YARD

5a) How do you walk on the school yard?
5b) Do you concentrate on any particular aspects?
5c) What are some important points you concentrate on?
5d) Do you pay much attention to the surroundings?

TRAVEL

6a) Do pupils have to travel far for your school?
6b) By what means of transport do pupils come to school?
6c) Do more pupils live far away or close by?

PUPILS

7a) Is there much diversity in deafness in the classroom?
7b) How does this affect the class?
7c) Does it affect the way you teach?
7d) Do you find that pupils experience stress?

INTERVIEW QUESTIONS STUDENT TU DELFT

START

1a) What is your name?
1b) How old are you?
1c) Are you deaf/hard-of-hearing?
1d) From birth or later?

BUILT ENVIRONMENT

2a) Do you ever experience any problems due to being deaf/ hard of hearing?
2b) Do you ever experience problems in the built environment?
2c) Do you have an example of a situation in which being deaf/ hard of hearing has caused problems?
2d) Do you have an example of a situation in which being deaf/ hard of hearing has caused positive things?
2e) Are there things in the built environment you think could be improved for deaf/ hard of hearing people?
2f) Are there things in the built environment which you think are good?
2g) Are there places in the built environment where you experience stress?

EDUCATION

3a) Have you always been in hearing schools?
3b) Are there things you find difficult at TU because you are deaf/ hard of hearing?
3c) Do you feel any kind of difficulty in attending classes at TU?
3d) Are there things in the education system that you think could be improved for deaf/ hard of hearing people?
3e) Are there things in the education system/ TU that you think are good?
3f) Is there a place at TU where you like to go with friends?
3g) Is there a place at TU where you like to go to relax/concentrate?
3h) How do you relax?
3i) What do you need to relax/concentrate?
3j) Are there places at TU where you experience stress?

FINAL

4a) Do you have any tips for me regarding my research on deaf/ hard of hearing people? Or things you would like to say?

APPENDIX II

PROFIEL

INTERVIEWNUMMER

01

NAAM

Lucas van der Meulen

FUNCTIE

student

LEEFTIJD

2e-jaars student

DOOF/SLECHTHOREND

slechthorend

WOONPLAATS

Delft

SCHOOL

TU Delft

STAD

Delft

OPMERKING

PROFIEL

INTERVIEWNUMMER

02

NAAM

Hidde

FUNCTIE

leerling bovenbouw

LEEFTIJD

bovenbouw

DOOF/SLECHTHOREND

slechthorend

WOONPLAATS

Rotterdam

SCHOOL

Kentalis College

STAD

Zoetermeer

OPMERKING

heeft ook verstandelijke beperking en TOS

PROFIEL

INTERVIEWNUMMER

03 (gelijk met 04 en 05)

NAAM

Turki

FUNCTIE

leerling bovenbouw

LEEFTIJD

bovenbouw

DOOF/SLECHTHOREND

slechthorend

WOONPLAATS

Den Haag

SCHOOL

Kentalis College

STAD

Zoetermeer

OPMERKING

NL is niet moedertaal, woont pas 3 jaar in NL

PROFIEL

INTERVIEWNUMMER

04 (gelijk met 03 en 05)

NAAM

Penda

FUNCTIE

leerling bovenbouw

LEEFTIJD

bovenbouw

DOOF/SLECHTHOREND

doof

WOONPLAATS

Den Haag

SCHOOL

Kentalis College

STAD

Zoetermeer

OPMERKING

NL is niet moedertaal, woont pas 3 jaar in NL

PROFIEL

INTERVIEWNUMMER

05 (gelijk met 03 en 04)

NAAM

Bram

FUNCTIE

docent

LEEFTIJD

30-40

DOOF/SLECHTHOREND

doof

WOONPLAATS

Amsterdam

SCHOOL

Kentalis College

STAD

Zoetermeer

OPMERKING

docent van Penda en Turki

PROFIEL

INTERVIEWNUMMER

06

NAAM

Karan

FUNCTIE

leerling bovenbouw

LEEFTIJD

bovenbouw

DOOF/SLECHTHOREND

slechthorend

WOONPLAATS

Almere

SCHOOL

Kentalis College

STAD

Zoetermeer

OPMERKING

PROFIEL

INTERVIEWNUMMER

07

NAAM

volledige klas (7 leerlingen)

FUNCTIE

leerlingen onderbouw

LEEFTIJD

onderbouw

DOOF/SLECHTHOREND

mix

WOONPLAATS

Almere, Beverwijk, Amsterdam, Zoetermeer, Den Haag 2x, Rotterdam

SCHOOL

Kentalis College

STAD

Zoetermeer

OPMERKING

mix van opleidingsniveau: mavo, havo en vwo

PROFIEL

INTERVIEWNUMMER

08

NAAM

Jan Willem

FUNCTIE

gymdocent en leidinggevende

LEEFTIJD

30-40

DOOF/SLECHTHOREND

slechthorend

WOONPLAATS

Alphen aan den Rijn

SCHOOL

Kentalis College

STAD

Zoetermeer

OPMERKING

PROFIEL

INTERVIEWNUMMER

09

NAAM

Alex

FUNCTIE

directeur

LEEFTIJD

volwassen

DOOF/SLECHTHOREND

horend

WOONPLAATS

-

SCHOOL

Kentalis Guyot VSO

STAD

Haren, Groningen

OPMERKING

PROFIEL

INTERVIEWNUMMER

10

NAAM

Jan-Willem

FUNCTIE

techniek docent

LEEFTIJD

volwassen

DOOF/SLECHTHOREND

doof

WOONPLAATS

-

SCHOOL

Kentalis Guyot VSO

STAD

Haren, Groningen

OPMERKING

PROFIEL

INTERVIEWNUMMER

11

NAAM

anoniem

FUNCTIE

leerling

LEEFTIJD

onderbouw

DOOF/SLECHTHOREND

slechthorend

WOONPLAATS

ver weg, dus woont op Het Verblijf

SCHOOL

Kentalis Guyot VSO

STAD

Haren, Groningen

OPMERKING

PROFIEL

INTERVIEWNUMMER

12

NAAM

-

FUNCTIE

begeleider

LEEFTIJD

volwassen

DOOF/SLECHTHOREND

horend

WOONPLAATS

-

SCHOOL

Het Verblijf

STAD

Haren, Groningen

OPMERKING

PROFIEL

INTERVIEWNUMMER

13

NAAM

-

FUNCTIE

begeleider

LEEFTIJD

volwassen

DOOF/SLECHTHOREND

horend

WOONPLAATS

-

SCHOOL

Het Verblijf

STAD

Haren, Groningen

OPMERKING

PROFIEL

INTERVIEWNUMMER

14

NAAM

Mike

FUNCTIE

conciërge

LEEFTIJD

volwassen

DOOF/SLECHTHOREND

slechthorend

WOONPLAATS

-

SCHOOL

Kentalis Guyot SO

STAD

Haren, Groningen

OPMERKING

PROFIEL

INTERVIEWNUMMER

15

NAAM

Anoniem

FUNCTIE

leerling

LEEFTIJD

6

DOOF/SLECHTHOREND

doof

WOONPLAATS

-

SCHOOL

Kentalis Guyot SO

STAD

Haren, Groningen

OPMERKING

PROFIEL

INTERVIEWNUMMER

16

NAAM

Henriët

FUNCTIE

docent

LEEFTIJD

volwassen

DOOF/SLECHTHOREND

horend

WOONPLAATS

-

SCHOOL

Kentalis Guyot VSO Vries

STAD

Vries, Groningen

OPMERKING

PROFIEL

INTERVIEWNUMMER

17

NAAM

Daphne

FUNCTIE

docent

LEEFTIJD

volwassen

DOOF/SLECHTHOREND

horend

WOONPLAATS

-

SCHOOL

Kentalis Guyot VSO Vries

STAD

Vries, Groningen

OPMERKING

PROFIEL

INTERVIEWNUMMER

18

NAAM

-

FUNCTIE

docent

LEEFTIJD

volwassen

DOOF/SLECHTHOREND

horend

WOONPLAATS

-

SCHOOL

Kentalis Guyot VSO Vries

STAD

Vries, Groningen

OPMERKING

PROFIEL

INTERVIEWNUMMER

19

NAAM

Samantha

FUNCTIE

docent

LEEFTIJD

volwassen

DOOF/SLECHTHOREND

horend

WOONPLAATS

-

SCHOOL

Kentalis Compas College

STAD

Sint-Michielsgestel

OPMERKING

PROFIEL

INTERVIEWNUMMER

20

NAAM

Yusuf

FUNCTIE

leerling

LEEFTIJD

3e klas

DOOF/SLECHTHOREND

slechthorend

WOONPLAATS

Onbekend, 1 uur reistijd

SCHOOL

Kentalis Compas College

STAD

Sint-Michielsgestel

OPMERKING

PROFIEL

INTERVIEWNUMMER

21

NAAM

Yasin

FUNCTIE

leerling

LEEFTIJD

3e klas

DOOF/SLECHTHOREND

slechthorend

WOONPLAATS

Oss

SCHOOL

Kentalis Compas College

STAD

Sint-Michielsgestel

OPMERKING

PROFIEL

INTERVIEWNUMMER

22

NAAM

Matthijs

FUNCTIE

leerling

LEEFTIJD

3e klas

DOOF/SLECHTHOREND

slechthorend

WOONPLAATS

Den Bosch

SCHOOL

Kentalis Compas College

STAD

Sint-Michielsgestel

OPMERKING

PROFIEL

INTERVIEWNUMMER

23

NAAM

Maarten

FUNCTIE

Conciërge

LEEFTIJD

volwassen

DOOF/SLECHTHOREND

doof

WOONPLAATS

-

SCHOOL

Kentalis Compas College

STAD

Sint-Michielsgestel

OPMERKING

PROFIEL

INTERVIEWNUMMER

0

NAAM

Frans

FUNCTIE

Directeur

LEEFTIJD

volwassen

DOOF/SLECHTHOREND

horend

WOONPLAATS

-

SCHOOL

Dr. M. Polanoschool

STAD

Rotterdam

OPMERKING

APPENDIX III

Figure 9. Andrew Propp. (2016). Entrance SLCC [Photograph]. Retrieved from https://www.washingtonian.com/2016/01/13/gallaudet-universitys-brilliant-surprising-architecture-for-the-deaf/

SORENSON LANGUAGE AND COMMUNICATION CENTER

MOBILITY & PROXIMITY

Mobility and Proximity is about creating clear walking routes, allowing signers to easily converse. An example for this is seen at the entrance of the Sorenson Language and Communication Center, or SLCC, at Gallaudet University, shown on figure 9. The entrance doors are automatic sliding doors, allowing signers to enter the building without having their conversation being interrupted. In the hallways, stairs and ramps, Mobility and Proximity is also implemented. They are all wider than normal so two people can walk next to each other and sign: to allow for 'signing space'. However, the building uses stairs as little as possible since stairs require visual attention: when walking up the stairs, you have to pay close attention to each step to see where you put your foot. For signers, this means that they have to deviate their line of sight from a conversation. Ramps reduce this. People can communicate more easily when walking up a ramp, they do not have to pay attention on where they need to walk.

SPACE & PROXIMITY

When deaf people sign they tend to keep a wide distance from another to better see each other's facial expression and to give space for signing. This distance between signers in conversation, known as 'signing space', is greater than that of a spoken conversation. The bigger a group in conversation, the bigger the signing space (Bauman, 2005).This impact of Space & Proximity can be noticed in the layout of the classrooms at Gallaudet University. Unlike most classrooms, the rooms at Gallaudet University have a different set up: the tables in the classrooms are formed in either a semi-circle or U-shape, allowing teachers and pupils to be constantly visually connected. All pupils can be involved in a discussion/conversation. There are no front row seats. This placement of tables however, is not only beneficial for deaf people, hearing people too will be more involved during class.

Another place where the impact can be observed is in the furnishing of the lobby of the SLCC. At the heart of this lobby is a custom-made, horseshoe-shaped seating (figure 10). This seating allows even a large group of people to sit and sign with each other. It allows for clear signing space. However, the size of this horseshoe-shaped seating is inconvenient for hearing people, who may not be able to hear people on the other side. It can therefore be argued that this design solution is not inclusive to all. Bauman himself, the architect

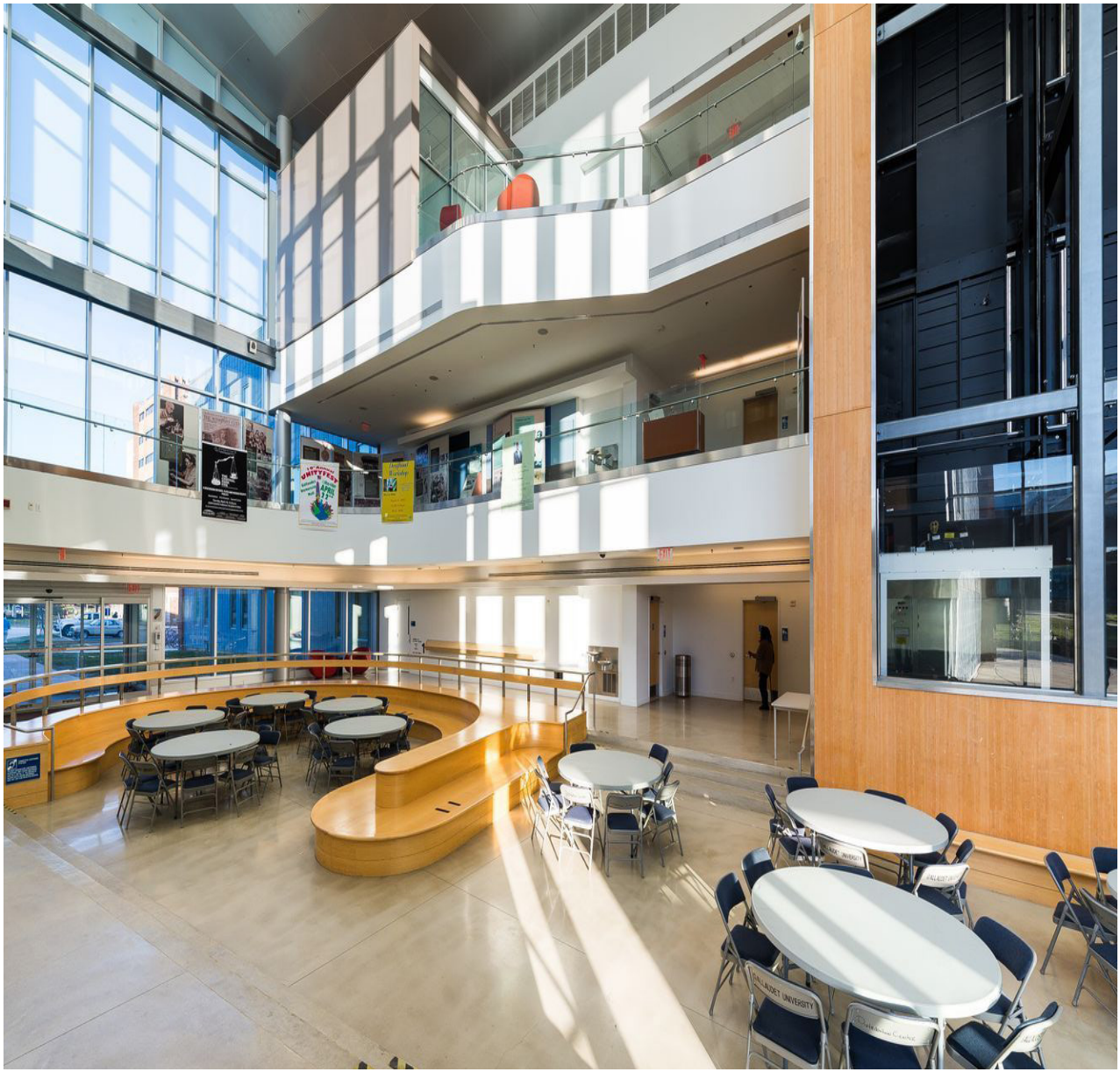

Figure 10. Gallaudet University. (n.d.-b). Lobby SLCC left view [Photograph]. Retrieved from https://www.usgbc.org/articles/leed-and-deafspace-designing-community-architecture

of Gallaudet University and co-creator of DeafSpace design, considers this horseshoe-shaped seating only partially successful: the curvature and rigidity of the backrest do not make the seat very flexible. It is better for signers to be able to move their seats around in order to make the right arrangement for a conversation.

SENSORY REACH

Sensory Reach, principle three, is when a deaf person walks into space and they immediately 'read' the entire room to maintain control. This is has been taken into account in the lobby of the SLCC at Gallaudet University. Here a sense of openness is clearly visible (figures 10 and 11). The design of the lobby is based around visual range: it has transparent lifts, balconies allowing for shared Sensory Reach and big open hallways. All these elements enable the lobby to have clear view lines everywhere. Deaf people can walk into this space and immediately 'read' the entire room to maintain control. They can easily scan the environment and activities around them. Furthermore, the entire lobby allows conversation to be constant by enabling people to sign between levels: because you can clearly see people on all floors, you can not only sign to people beside you, but also with people a floor higher.

Another example of Sensory Reach is when you are looking for a free classroom to use. Where hearing people can hear people talking behind a closed door, deaf people are not able to. Deaf people benefit from a glass door so that they can see what is happening behind it. Or in other words: transparency is important. Gallaudet University used this as a design solution for its doors. All the doors of the SLCC building have glass panels to make visible what is going on behind it, to see if a room is being used or to see if someone is at the door. Having said that, in classrooms or offices opaque glass panels are used to give a sense of privacy: through opaque glass, only the silhouette of people can be seen. This maintains privacy in a room, while still allowing the right information to be visible (whether a room is used or not). In addition to this another design solution for Sensory Reach is used at Gallaudet University: the building uses mirrors or reflective materials to help people see what is happening behind them. With the help of reflection deaf people can be alerted when someone approaches from behind, as they cannot hear people walking towards them.

LIGHT & COLOUR

Reading facial expression and lips, is crucial while signing. Glare, shadows or backlighting, but also wall colour that is similar to a person's skin tone, can interrupt and distract from conversations and can make reading peoples facial expressions and lips difficult. A lack of proper lighting and colour can lead to loss of concentration and even physical exhaustion (Bauman, 2005). The lobby of the SLCC also follows the principle

Figure 11. McMullan & Associates. (n.d.). Lobby SLCC right view [Photograph]. Retrieved from https://www.mcmse.com/gallaudet-sorenson

of Light and Colours. As seen on figure 10, two walls of the lobby are curtain walls, which fill the space with natural light. These curtain walls face the north and west, meaning that little to no sunlight fills the lobby. Therefore sparing the eyes of signers as much as possible. However, the west-facing curtain wall does bring in direct sunlight at later times of the day, which can cause a problem for signers.

Outside the principle is also visible. Here, in front of the façade, filled with full-height windows, a row of columns is placed to create a covered exterior walkway (figure 9). The columns shield both this walkway and the windows behind it from bright sunlight. In this way, (day)light is controlled to create soft diffuse light to allow for better circumstances for signers. Eye strain, or 'deaf eyes', for signers is thus drastically reduced.

ACOUSTICS

It is remarkable that the Acoustics in the lobby of the SLCC at Gallaudet University are not optimal. The floor of the lobby creates reverberation and excess sounds can be heard through the lobby (Dobson, 2011). A different kind of material on the floor and absorptive panels on the upper parts of the walls to absorb excess sound could be a solution to these problems.

Figure 12. Prakash Patel. (2012a). Common room LLRH 6 [Photograph]. Retrieved from http://ltlarchitects.com/gallaudet-university-residence-hall

Figure 13. Prakash Patel. (2012c). Common room LLRH 6 during event [Photograph]. Retrieved from http://ltlarchitects.com/gallaudet-university-residence-hall

LIVING AND LEARNING RESIDENCE HALL 6

MOBILITY & PROXIMITY

In the common room of the Living and Learning Residence Hall 6, or LLRH 6, Mobility and Proximity is implemented with use of a ramp, as seen on figure 12 on the right. The ramp is wide enough so two people can walk next to each other and sign: to allow for 'signing space'. People can communicate more easily when walking up a ramp, they do not have to pay attention on where they need to walk.

SPACE & PROXIMITY

When deaf people sign they tend to keep a wide distance from another to better see each other's facial expression and to give space for signing. This distance between signers in conversation, known as 'signing space', is greater than that of a spoken conversation. The bigger a group in conversation, the bigger the signing space (Bauman, 2005). This principle is implemented in the common room of the LLRH 6 in multiple ways. It can accommodate a large number of pupils with free-standing seats and an amphitheatre-like area to hang out in or for lectures and other social events (figures 12 and 13), while still maintaining a proper distance form each other. In this common area, in contrast with the SLCC, pupils can easily grab a chair to join a conversation.

SENSORY REACH

When a deaf person walks into space and they immediately 'read' the entire room to maintain control. They scan the environment and activities around them and see things that hearing people tend to overlook. Think of the movement of shadows or subtle changes in facial expressions and the positions of other people (Bauman, 2005). This is principle Sensory Reach is clearly visible in the common room of the LLRH 6, as seen on figures 12 and 13. The room allows for immediate overview of the entire space.

LIGHT & COLOUR

Reading facial expression and lips, is crucial while signing. Wall colour that is similar to a person's skin tone can interrupt and distract from conversations and can make reading peoples facial expressions and lips difficult (Bauman, 2005). More generally, the LLRH 6 uses muted blues and greens to contrast a range of skin tones to reduce eye strain and use diffused light to make reading people's facial expressions and lips easier, as can be seen in figures 12.

TU Delft
BK Bouwkunde