

Knauf, Helen: Visual Environmental Scale: Analysing the Early Childhood Education Environment.

Date of secondary publication: 18.09.2023

Journal Article | Accepted Manuscript (Postprint)

This version is available at: <https://doi.org/10.57720/3605>

Primary publication

Knauf, Helen 2019: "Visual Environmental Scale: Analysing the Early Childhood Education Environment"; in: Early Childhood Education Journal, 47 (1), 43-51. Available online: <https://doi.org/10.1007/s10643-018-0914-x>.

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Visual Environmental Scale: Analysing the Early Childhood Education

Environment

Although children's physical environments play an important role in their development, there have been few empirical studies on the interior design of early childhood centres. This is partly due to a lack of adequate methods and instruments for the systematic spatial investigation of educational environments. In light of this, the following paper presents a qualitative method for such systematic investigation, which we shall call *visual environment analysis*. It also presents the results of the application of this method to ten early childhood centre environments, which can be ranged between the two extremes of restraint and expressiveness. The analysis shows that early childhood centre environments may be shaped by partly conflicting aims, such as giving children as much freedom as possible on the one hand and providing them with a stimulating atmosphere on the other. The paper therefore discusses both *visual environment analysis* as a method and, in applying this method, the interior design of a number of educational environments.

Keywords: early childhood education centre; interior design; environment; research methods; visual analysis

The Significance of the Learning Environment for Children's Education and Development

Children's physical surroundings have a strong influence on their education and development. The younger the child, the closer the connection between her motor development and her cognitive development, and thus the more important the surrounding environment and the opportunities and challenges it presents (Wilk and Jasmund 2015). The literature has placed particular emphasis on the close connection between motor development and language development (Morrow 2007). An environment containing an array of physical challenges and offering sufficient space would therefore seem particularly important for children's development (Bensel and Haug-Schnabel 2012; Kantrowitz and Evans 2016; Morrissey et al. 2015). Commentators have thus placed particular value on the provision of a wide range of sensory stimuli. Gutknecht (2016), for example, has indicated the significance of the 'responsivity' of the environment, since this allows children to influence and control it. In independently manipulating their environment, children can come to experience self-efficacy (Behnke et al. 2012). Other factors that have a less direct yet no less important influence on children's development include a pleasant and healthy atmosphere, good light, and favourable acoustics (i.e. as little noise emission as possible) (Maxwell 1996). As well as having a positive effect on children's cognitive development, good interior design may also advantageously influence their social behaviour and social participation (Abbas and Othman 2010; Czalczyńska-Podolska 2014; Read et al. 2016). Where interior design is concerned, many commentators

have observed that children may have very different needs depending on their personalities and physical capacities (e.g. children with disabilities) (Colver et al. 2012; Wachs 1989).

The results of these empirical studies reflect a number of long-standing theoretical concepts in early childhood education studies. Pestalozzi's notion of 'living rooms,' for instance, puts the environment centre stage in his educational theory (Stieve 2013). Likewise, the 'prepared environment' plays a crucial role in Montessori's (1949/1989) work. Today, it is common to speak of the environment as a 'third teacher' – a notion that goes back to early childhood centres in Reggio Emilia (Strong-Wilson and Ellis 2007), where interior design is considered a key element of educational practice. Furthermore, the interior design of a learning environment can be seen as an instantiation of a particular educational theory (Kasüschke 2016). Certain spatial elements, for example, often serve to identify particular educational approaches, such as mirrors in Reggio Emilia early childhood centres, or pastel tones in Waldorf centres. These various approaches are all based around the idea that a stimulating, carefully designed environment will provide children with a safe sphere in which to become active learners and make their own discoveries. Such self-directed learning has now become a key paradigm in contemporary early education theory – one in which the child takes on the role of an explorer, independently investigating her environment and thereby appropriating it (z. B. Murray 2017). The physical environment and the objects it contains can be understood here as a representation of the world; it is therefore in investigating and discovering them that children come

to engage with the world (Stenger 2013). From this perspective, architecture and interior design can then be seen as educational media (Nugel 2014).

The paper presented here shows that in contrast to the importance of the environment for child development and learning, there still is little research with focus on early childhood settings. In the following the complex interrelation between the different influencing factors are presented. Subsequently a newly developed tool for a differentiated understanding of early childhood environments, the visual environmental scale, is applied in ten early childhood centres in Germany (Pre-K to K).

Early Childhood Environments as complex and rarely analysed constructions

The environment in early childhood education settings has been little studied up to now. As the overview in the previous section shows, there are primarily individual aspects explored. In contrast, classrooms in schools have been researched in comprehensive manner; the high impact of environmental conditions for learning and the development of academic skills has been shown in many different ways (e.g. Barrett et al. 2016; Dockrell & Shield 2006; Higgins et al. 2005). However, the common standard for measuring the impact of the environment are the learning outcomes. This standard is not applicable for early childhood settings, though.

Early childhood centre environments are not only shaped by educational theories; their interior design is also influenced by implicit attitudes toward and

beliefs about children and childhood education (Knauf 2017). In planning and designing kindergarten spaces, technical and formal factors play a key role alongside more intrinsic factors pertaining to kindergarten activities. The architecture of the building, for example, exerts a crucial influence on its interior design. When using a space for educational purposes, it is often necessary to ensure that legal requirements concerning safety and size are satisfied, which means that educational considerations are often only incorporated at the end of any building or renovation process (Petmecky 2008; Wilk and Jasmund 2015). In general, early childhood centre environments tend to be exclusively planned and designed by adults, though children's perspectives on the same environment – even just on account of their height difference – may vary considerably (Day and Midbjer 2007). Studies have shown that incorporating children's perspectives can lead to new and alternative elements and goals being brought into the interior design of learning environments (Morrissey et al. 2015).

As a social category, the notion of the environment has become increasingly important in social-scientific and education research in recent years. In the context of the 'spatial turn,' the environment is not regarded as something physical or physically given, but rather as a human construct, in accordance with a 'relational understanding of space' (Gulson and Symes 2007). In engaging with environments in early childhood education centres, the notion of the duality of the environment is particularly important. This assumes that human actions and social relations significantly influence and co-constitute the surrounding environment, which in turn

significantly impacts on and influences human actions (Löw 2013). As Figure 1 illustrates, the environment and action mutually condition one another:

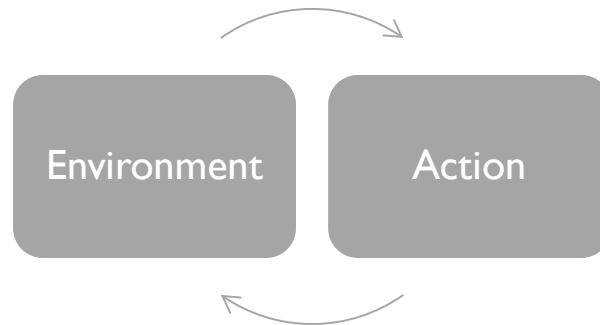


Fig. 1: Reciprocal relationship between environment and action

This reciprocal relationship on the one hand illuminates the effect of the environment on (educational) action, and on the other reveals the environment to be something that is created by those who act within it.

Despite the importance of the environment in early childhood education in particular, there has thus far been little empirical research focussing on specific early childhood centres. This is partly due to the paucity of suitable methodological tools for such research. Some standardised qualitative measurement methods do assess and evaluate the spatial environment, such as the 'Early Childhood Environment Rating Scale (ECERS-R)' (Harms et al. 2014) and its numerous international variants (e.g. Tietze et al. 2017 in Germany). Nevertheless, they only do so in a very rough manner; of the 43 total items in the ECERR-R, for instance, only eight refer to the

environment. The 'Children's Physical Environment Rating Scale (CPERS)' (Moore and Sugiyama 2007), meanwhile, does aim to specifically evaluate the physical environment and allows for meaningful comparisons between different institutions, all while providing a systematic approach. It nonetheless fails to provide a holistic treatment that would take account of the diversity of potential environment settings and do justice to the interaction between the various actors who shape the environments' interior design. Furthermore, the explanatory power of ECERS-R measurements has been shown in recent studies to be less precise than it might appear (Gordon et al. 2015). Against this backdrop, we put forward *visual environment analysis* here as a qualitative method for the nuanced assessment of early childhood centre environments, and describe its practical application to a number of such environments. The aim of *visual environment analysis* is to precisely describe and analyse the interior design of a given environment.

Methods

As presented here, *visual environment analysis* consists in the non-participatory observation of a natural (as opposed to artificially created) situation (Knauf 2017). The object of analysis, however, is not an interactive situation, but rather the physical environment itself. The data on which the analysis is based are photographs, which in the following will be treated similarly to field notes. To this extent, *visual environment analysis* can be distinguished from forms of photographic and image analysis that focus on the composition of the image and its attendant

'intractability and autonomy' (Bohnsack 2006). In *visual environment analysis*, the image rather serves to document a spatial situation; what matters is therefore not the image as a medium but rather the three-dimensional world that the image depicts.

In accordance with grounded theory, in which all empirical states of affairs can be considered (research) data (Corbin and Strauss 2014), the interior design of early childhood centre environments will be interpreted in what follows as an expression of educational attitudes and approaches. *Visual environment analysis* is to be understood in Clarke's (2003) sense as a semiotics of objects in which human beings and objects enjoy a reciprocal relationship to one another. The systematic description and analysis of this reciprocal relationship constitutes a key dimension of *visual environment analysis*.

For our analysis, we selected 10 group environments used for children between three and six in early childhood centres in Germany. In line with the principles of grounded theory, we aimed to select institutions that were as diverse as possible, so as to include a wide range of 'theories' or research approaches in the study. The environment analyses involved three stages:

1. *Data collection.* The study data consisted of photographs. A frontal photograph was taken of all four walls of each environment (as shown in Figures 2 and 3), along with a panoramic view of the space (as in Figure 4). Close-up pictures were also taken in all of the environments (as in Figures 5 and 6) in a situation-specific and subjective manner, and fulfilled the same function as personalised follow-up questions in qualitative interviews.

2. *Description.* In the second stage, precise written descriptions of the environments were produced that attended to their various material dimensions. In order to ensure their comparability, the descriptions all addressed the following elements: the basic architectural features of the environment, its furnishings and fittings, its playing and learning materials, and its panels and decorations.

3. *Coding.* The environment attributes identified in the descriptions were then assigned different codes. In accordance with grounded theory, these codes were identified via open and axial coding (Knauf 2017) through a pilot study. They comprise:

- *Transparency:* the openness of the environment and the presence of clear reference points within it.
- *Accessibility:* the elements contained in the environment (such as shelves and materials) may be more or less accessible to children; this code measures the different levels of accessibility of each environment.
- *Materials:* the range of craft and building materials, toys, opportunities for movement, and visual stimuli eliciting action or reflection.
- *Representation of children and teaching staff:* how the teachers and children and their activities are depicted (e.g. through wall panels, items produced by the children, posters).

- Means of addressing parents: elements in the environment that are explicitly intended for parents (e.g. posters, panels showing children's activities).
- Structure: the division of the environment into different areas.
- Flexibility: the environment's versatility and adaptability to various purposes.

The environments were first individually described and coded. In the final analytical stage, they were then compared with one another.

Results

The analysis of environments reveals typical patterns of the interior design of rooms in early childhood centres. The following presentation of the results is related to the codes introduced above which are key to the patterns of environmental settings.

Transparency and accessibility are joined in one section, as they have similar performances in praxis. Each pattern will be characterized and clarified by examples.

Transparency

On the whole, the environments studied are characterised by a high level of transparency. Transparency is understood as the possibility for children (regarding their body height) to oversee the whole room. The transparency of the environments' basic layouts and furnishing already ensures a certain level of accessibility for the children. Yet accessibility also depends on how visible materials are and how easily

they can be reached. In most of the rooms, it is possible to see all of the different areas from any point within them. This is partly due to the fact that most are rectangular in shape, with only one L-shaped room and one angular room. The interior design of the environments likewise does not diminish their transparency, since taller items of furniture are placed along the walls and it is only smaller items of furniture (such as shelving units, tables, and sofas) that extend into the room. Fitted units or mezzanine levels that are difficult or impossible to see into and that could form a place of retreat are rarely found. Other important aspects of transparency include glass elements or holes in the walls that make it possible to see outside or into neighbouring rooms. All of the early childhood centres possess large window elements, ensuring external transparency in particular. This provides clarity for both adults and children. In all of the environments, the materials were kept at a height that the children could comfortably reach.



Figures 2 and 3: Sample environment 1



Figure 4: Sample environment 2

Materials

Greater variation can be observed with respect to the wealth of materials in the different environments and the way in which they are presented. Though books, for example, can be found in all of the spaces, they are displayed very differently. They may be kept in boxes, or on presentation shelves with their covers facing out (as

in Figure 2), or on shelves where only their spines are visible (as in Figure 4, back left). Playing materials (ranging from building toys to clothing) are sometimes presented in a way that allows children to see them easily, such as on clothes hangers on a rail (see Figure 5) or in open boxes on the floor (Figure 6). There are nonetheless also less visible modes of presentation, including drawers and boxes, which are furnished with photos or labels. Painting and craft materials are sometimes displayed very invitingly, as when sheets of paper are set up on an easel and paints, brushes, and water are placed alongside. The wealth of material also varies from environment to environment. In some of the environments that contain relatively little material, this material may also be presented in a relatively inaccessible manner (as in Figure 4), while in others it may be presented in a particularly inviting manner (Figures 2 and 3).

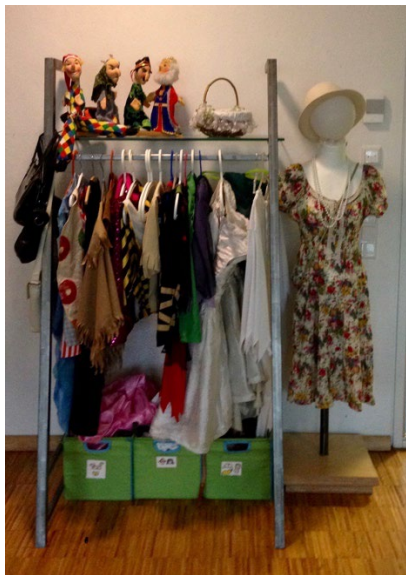


Figure 5: Clearly visible modes of presentation



Figure 6: Building block corner with wall panels

Representation of Children

There is also significant variation where the representation of children is concerned. Children are depicted in a variety of ways in the different environments, either through photos or through the items they have produced. All of the environments, for example, contain portfolio folders with photos of the children on the spines. Birthday calendars with a photo of each child next to his or her birthday are also common. Many of the environments also contain handicrafts produced by the children, which are sometimes accompanied by photos documenting the creation process. In this way, the children's activities are made visible. Mirrors have been installed in some of the environments, which allow children to see themselves and their actions within the space. There are also theme-specific wall panels containing photos of the children and drawings produced by them. These panels are often related to the materials that can be found in the surrounding area. Next to the building block toys in one environment, for instance, we can find photos and children's drawings of the structures they have built with them, along with photos of the children playing with the blocks at this spot (see Figure 6). These different

representations demonstrate that the environment changes in response to and adapts to the children occupying it. Through the children's presence, these representations suggest, the environment takes on a specific character. We can nonetheless observe that the adults who live and work in the environments – the teaching staff – are not represented there. Their own area may be restricted to a desk, for example, and they only leave behind anonymous traces within the environment (in the form of decorations or wall panels).

Representation of Adults

In the majority of the early childhood centres, parents are also not represented: photos of children and their families are displayed in only one of the environments. Nevertheless, photos of the families and pictures or drawings of the teaching staff are often on display in the cloakroom areas, *on the way to* the group environments. These hallway areas generally also contain notice boards intended for parents and families. Such areas, however, were not part of our study, which focussed exclusively on the group environments.

Structure

Furniture is one of the main means of giving structure to a space. Our analysis first shows that the furniture in all of the environments is very similar, consisting of tables and chairs at a height appropriate for children, low shelving units (around 80 cm in height), and high shelves and cupboards (around 180 cm). Some environments also contain sofas or mattresses. These items of furniture are arranged in the same way in all of the environments: tall cupboards and shelving units are placed along the

walls, while lower shelving units, tables, and chairs are spread throughout the room. There are nonetheless differences in detail: some environments are dominated, for example, by tables placed in the middle of the room, while in others low shelving units are used to mark off different areas, such as block areas or reading corners. This differentiation is more heavily emphasised when these units extend further into the room or when curtains are also hung from the ceiling. Other elements that promote particular activities include rugs (which invite children to play on the floor) and sofas (which invite them to sit comfortably). In some environments, furniture and fabrics are used very intensively to give structure to the room, whereas in others there are very few fabrics and the furniture is merely used for storage or sitting purposes.

One environment represents an exception where furniture is concerned. Over a quarter of its space is taken up by a custom-made fitted unit with two levels, which children can climb up. The lower level contains a number of openings that lead to hidden passages and cavities. Windows placed in the unit's wooden wall make it possible to look in and out.

Flexibility

Since some of the environments contain only a few items of furniture, they are characterised by large areas of free space. Others contain many items of furniture, which means they are dominated by relatively fixed-purpose areas that do not allow for spontaneous change. The number of items of furniture in the environment therefore exerts a strong influence on its flexibility: the less furniture there is, the more the room can be adapted to the present requirements and needs of the

children. In addition, some environments contain shelving units or boxes on wheels, which can be easily moved around.

Discussion

Our environment analysis has shown strong similarities between the different environments with respect to their basic layout and the furniture they contain. The environments are nonetheless arranged and used in very different ways. In terms of their interior design elements, we can identify two ideal environment types: a restrained environment and an expressive environment. These represent the opposite ends of a scale on which particular learning environments can be ranged. In the following descriptions of the two environment types, we shall aim to distinguish them as clearly as possible.

The Restrained Environment

These early childhood centre environments are distinguished by large open spaces containing neither furniture nor playing and learning materials. In order to create these open spaces, the furniture (shelving units, cupboards, sofas) has generally been placed along the walls. Figure 7 presents a schematic drawing of the layout in a restrained environment.

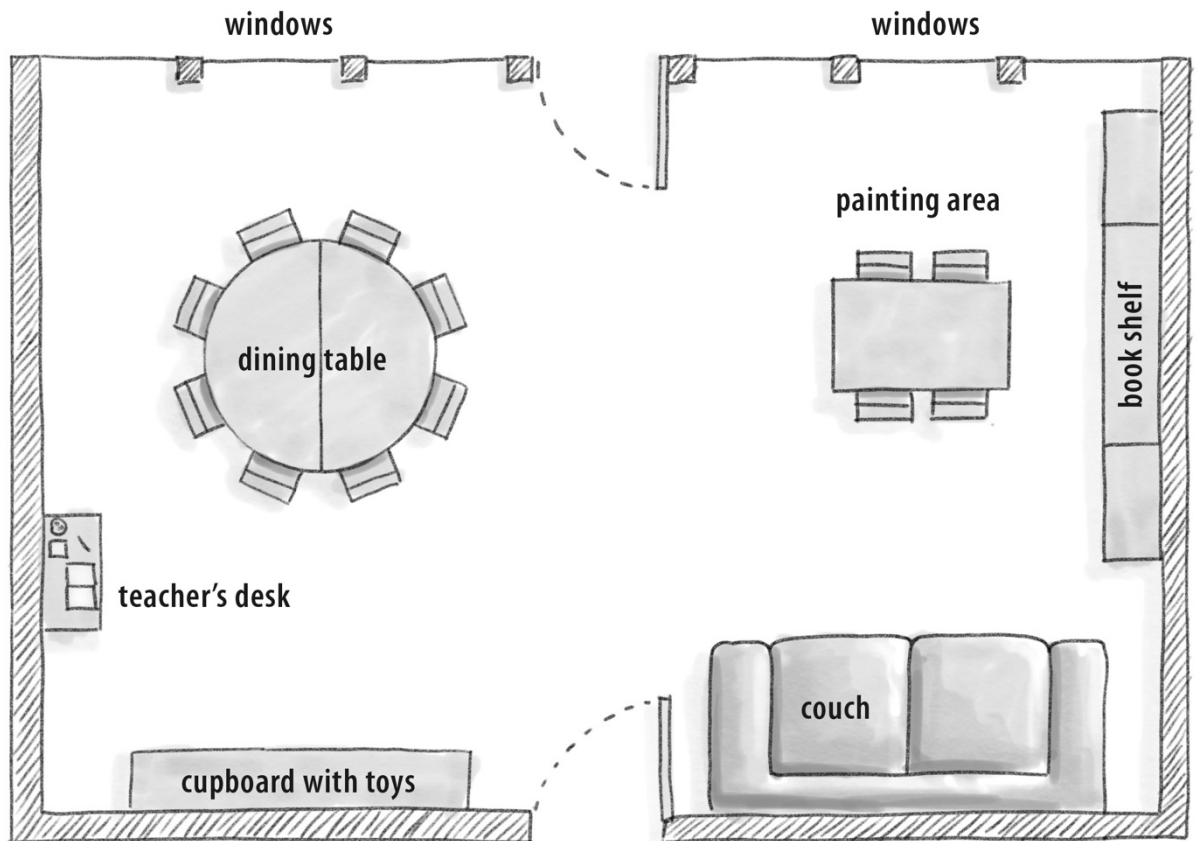


Fig. 7: Schematic drawing restrained environment

The environment therefore remains flexible and can quickly and easily be adapted to the interests and needs of the children in any given situation. This flexibility can be seen as a key characteristic of innovative interior design for educational environments, since it places children's situation-specific needs at the forefront (Walden 2007). The transparency created by the layout of the environment and its furnishing allows for a high degree of openness. This not only allows the teaching staff to adequately supervise the children; it also allows the children to maintain an overview of the space and see what other children are doing elsewhere in the room, and thereby to discover new possibilities for their own play and cooperative activities. Such forms of interior design can reflect an attentiveness to

children and their needs (their curiosity, their need to understand, their need for self-efficacy, and so on) (Bensel and Haug-Schnabel 2012).

The restrained environment is also characterised by a limited number of visual stimuli such as wall panels, mirrors, and images, which gives the children the freedom to make spontaneous use of the wall space and the surrounding areas. The children are also not represented through photos or through the items they have produced, since the environment is adapted to the needs of the situation and therefore contains few traces of the past that could be associated with certain pre-defined and potentially restrictive uses.

The material is also presented in a restrained manner. Books are stacked on top of one another and are not imposed on the children; toys are packed away in drawers and boxes in an orderly manner; board games are also stacked on top of one another. The material is nonetheless kept at a height appropriate for children, so that they can reach it without assistance. The amount of material is limited, to prevent children from being distracted or overburdened.

This environment design gives the children significant room for improvisation. As Kantrowitz und Evans (2016) have shown, a large amount of space can have a positive effect on children's play behaviour. Free space can be shaped according to children's needs and allows them to discover or create secret and "undefined" areas within the environment (Simms 2012).

In our analysis, it nonetheless became clear that the restrained environment may be lacking in stimuli. Figure 4, for example, shows an environment in which

children have a large amount of space, but also have little encouragement to play, learn, and develop. Though accessibility is granted here in a purely technical sense, it is also obstructed by the fact that the material is barely visible in some of the environments. Accessibility can be enabled or obstructed at various levels, and theoretical attainability is only a necessary and not yet sufficient condition of accessibility. Free space is important insofar as it enables children to act for themselves, yet in order for children to really make use of this freedom, they also require materials.

The Expressive Environment

In expressive environments, different functional areas are clearly marked and distinguished from one another. This provides children with clear guidance as to which activities (should) take place in which areas, as it is shown in the schematic drawing in Figure 9.

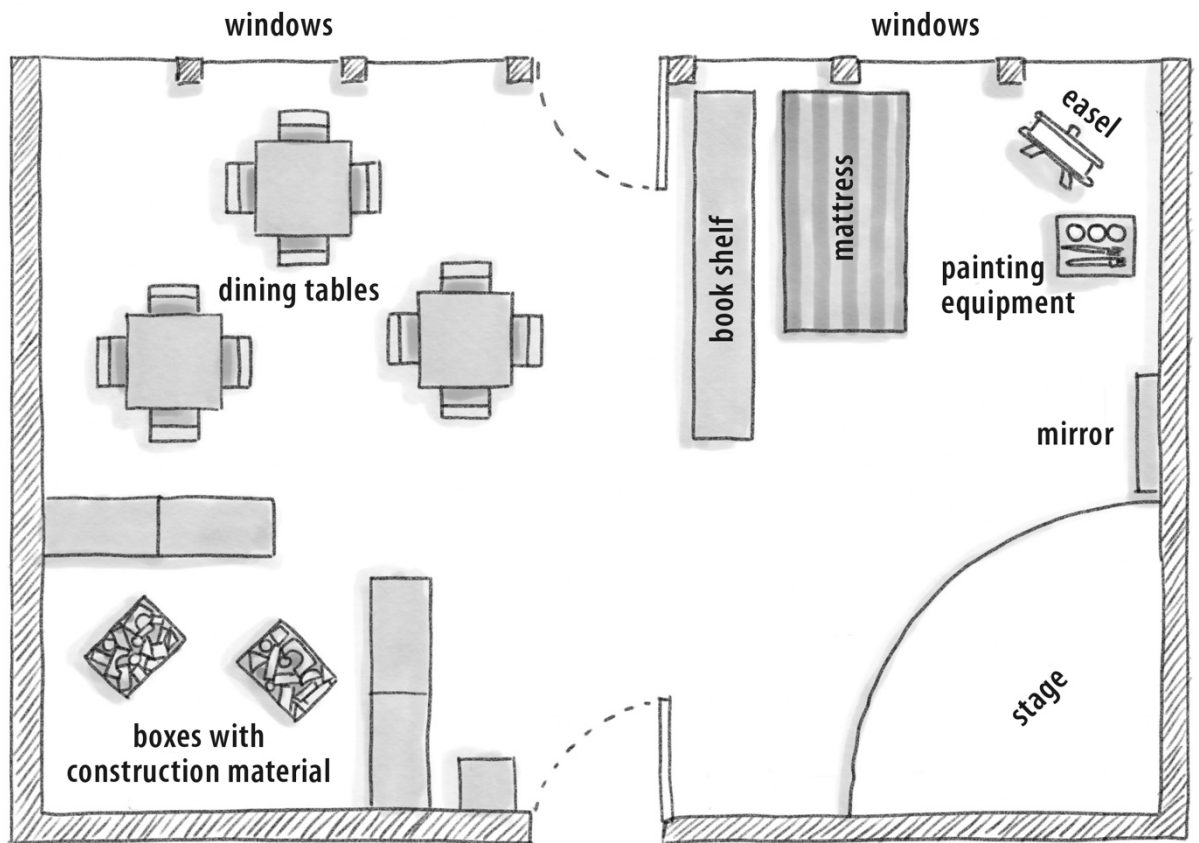


Fig. 8: Schematic drawing of an expressive Environment

The environment's structure also lends it a sense of safety and security (Sopp 2007). If we understand education in accordance with Stieve (2013, 104) as a mode of "putting oneself into relation," then disturbances and irritations can be seen as fundamental preconditions for educational processes. Furniture and learning materials with a strong presence can then function as irritants and thereby stimulate educational processes. Like restrained environments, expressive environments are in principle open, yet contain areas that are not as visible as others, into which children can withdraw and enjoy moments of privacy.

The structured nature of the expressive environment is strengthened through wall panels showing how the various materials may be used. These panels may

consist of photos of the children working with the materials or the results of their work. In this way, the panels also serve to represent the children within the environment. Through these photographs and through their craftwork, the children leave behind visible traces in the environment, and wall panels depicting shared activities, projects, and experiences allow the children to appropriate the space for themselves.

Our study found that clearly structured environments also tend to contain a large amount of material, or material that is presented in a very conspicuous manner (as with the items of clothing in Figure 4). Care is taken not only to store this material at a height appropriate for children, but also to present it in an attractive and stimulating manner. This inviting presentation style ensures that the material is emotionally accessible to children rather than just technically accessible.

The expressive environment offers children a highly stimulating space. They can use the wealth of material on offer by themselves and can clearly orient themselves thanks to its clear structure. Clearly differentiated areas make it possible to satisfy a range of needs – including the need to withdraw by oneself. This environment type therefore dovetails with contemporary conceptions of early childhood education, which are characterised by self-directed learning and discovery. Our analysis nonetheless also shows that it is adults who plan such environments and who decide what should be positioned where and how. If the environment in an early childhood centre is understood as an educational medium (Nugel 2014), then in such

environments the ordering, structuring, and thus guiding hand of the teaching staff is particularly prevalent.

Conclusion

Our study shows that *visual environment analysis* can provide a deeper understanding of interior design in early childhood centres. Since this was a purely observational study, its explanatory power is nonetheless limited. It could be expanded upon by triangulating the *visual environment analysis* with discursive research methods such as interviews or group discussions. In addition, the analysis of aspects such as light, colour, and building materials, (e.g. wood, concrete) which were excluded on our approach, could further enrich the study results. Finally, the decision to focus only on group environments proved to be restrictive, since in many institutions adjoining rooms and hallway areas are also used for educational purposes. It would therefore be worthwhile to broaden the focus of the study.

The analysis of our ten early childhood centre group environments showed that interior design is marked here by conflicting yet equally important goals. These include: providing a clear structure and enabling flexibility, ensuring transparency and allowing privacy and withdrawal, and remembering the past and living in the moment. In the struggle to satisfy these conflicting demands, complex structures emerge that aim to give children the greatest possible range of stimuli and activities. This suggests that a possible future approach to early childhood centre environments would be to attempt to implement a minimalistic form of interior design that

provides both free space and sufficient stimuli, by carefully choosing and limiting the visual and physical impulses it contains.

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