

Children and the Physical Environment in School Settings

Case studies in Danish *folkeskoler* from a socio-ecological approach

Shunsuke Itoh

*Report submitted to Danish Building and Urban Research (By og Byg),
February, 2001*

CONTENTS

ACKNOWLEDGEMENTS iii

SUMMARY iv

1. INTRODUCTION 1
 - 1.1 Aims and backgrounds 1
 - 1.2 Process and method 4
 - 1.3 The four schools 5

2. SPACE IN LEARNING SITUATIONS 8
 - 2.1 Spatial setting 8
 - 2.2 Activity and spatial setting analysis 9
 - 2.3 Comparison with Japanese schools 10

3. SPACE IN CHILDREN'S BEHAVIOR 14
 - 3.1 General characteristics 14
 - 3.2 Location/context specific behavior 17
 - 3.3 Behavioral structure of the common rooms 18
 - 3.4 Behavior patterns and social experience 21

4. DISCUSSIONS 25
 - 4.1 Lessons for Japan 25
 - 4.2 Concepts of individual/self 26
 - 4.3 Concluding comments: areas for further research 27

REFERENCES 31

ACKNOWLEDGEMENTS

This report is a result of my post-doctoral project as guest researcher at Danish Building and Urban Research (By og Byg). The project was financially supported by the Danish Government Scholarship from the Danish Rectors' Conference, and from Cirius (The Danish centre for international cooperation and mobility in education and training) in the final stage. I am grateful for their generous support. I am also very grateful to the Danish Building and Urban Research for allowing me work at the institute and for their support to the project.

I would like to thank the children and teachers/pedagogues of Bistrupskolen, Holsbjergskolen, Sjælsøskolen, and Stenvadskolen for allowing me carry out this research in their schools. The research would not have been possible without their understanding and openness. I would also like to thank Bodil Bøiehøj and Svend-Erik Nyholm Johansen for giving me broad information on Danish school life from their experience as teachers, and bringing me to their schools for pilot observations.

Thank you to my supervisor Inge Mette Kirkeby for her extensive and kind help, advice, comments, and discussions throughout the research. My work could not have developed this far without the exchanges with her. Thank you to Claus Bech-Danielsen for many discussions and for commenting on earlier drafts. Thank you to Marianne Krogh Jensen for many inspirations.

Thank you to Hilary Adler and Jens Hvass for their discussions on cultural aspects of space. Their deep insights into both Danish and Japanese architecture and culture helped me develop ideas and consider them from different angles, and gave me a broader view towards architecture.

Finally I would like to thank the participants of the seminar held at Danish Building and Urban Research on 7 February, 2001. Their comments and questions have given me many clues for further elaboration and development of the research.

February, 2001

Shunsuke Itoh

SUMMARY

Aims and process

The present research explored how children's interactions with the physical environment take place and what they mean in the everyday life of school. The school was viewed as a setting for children's socio-cultural development, and how space works in this context was studied. The aim was to provide empirical material and a frame of understanding for a deeper insight into the school environment as a place children 'live' in.

Children's interactions with space were viewed in a broad sense, including active, immediate and passive, in-direct interactions. Since how adults set-up and use space influence children's experience of space, two types of interactions were explored: how space is used in educational activities creating the situations children experience space in, and how children use space in their behavior. Field studies were carried out in four Danish *folkeskoler* and the observations were interpreted in comparison with my earlier case studies in Japanese schools.

Teachers' use of space

The use of space in classrooms and common rooms in learning activities were analyzed by an *activity x spatial setting* matrix, describing how space is used according to the contents of the activities. The use of space basically followed a functional pattern: space was used as a tool in response to practical needs for the activity such as larger work surfaces and acoustic privacy. That means children were working on their own but at their own seats in the classroom if the task did not require a larger space, and they were sitting at separate places when they were working in groups or on creative tasks.

In contrast, in Japanese open-schools, space-use often follows a symbolic pattern: space is used to communicate a message to the children by changing the atmosphere. Children are free to work where they like whenever they are not taught in classes. That means children could be sitting freely but may be working on a traditional task. The aim is to tell children that they are to work separately by letting them choose their work places.

Though space has both functional and symbolic aspects at the same time, the contrast seen between the Danish and Japanese cases suggested that cultural concepts and attitudes towards space (*spatiality*) are represented in the organization of learning situations. Generally speaking, space is more objectified as a physical entity in Western culture, while in Japanese culture space (physical dimension of the environment) is viewed as having a closer, often literal, connection with the meaning. That means, the spatial setting being 'open' has more significance in the Japanese context than in the Danish context. In this way, children experience space as having cultural meanings in the learning situations.

Children's use of space

Children's behaviors were viewed as expressions of individual and group consciousness. There were different levels combined in behavior: consciousness of the individual, consciousness of the relation between the individual and group, and consciousness of relations between groups. Children created small places in larger spaces by using various physical elements of the environment such as furniture, windows, columns, and sometimes light, suggesting their needs

for 'my' or 'our' place. In many cases, they chose and created places away from the classroom but where they could keep a visual connection with the classroom at the same time. This was seen as a balance between the needs for privacy and independence, and for feeling belonging to a group (in this case their home-class). Relations between groups were seen in territorial structures in the common rooms. Areas in front of classrooms became territories of the particular class where children from other grades did not enter. Interactions between different grade levels happened mostly at the invisible borders between class territories and spaces of a more public character.

In general, many social interactions happened across borders and thresholds, in 'I am here, you are there' situations in which children of different groups occupied separate sides. The borders/thresholds could be either physical borders (different floor levels, doorways, distances) or behavioral borders that were visible only when children occupied and used the space. The observations suggest that children associate places with individual/group identity and structure relations between them as spatial relations across physical or perceived borders. In architecturally well-differentiated common rooms the behavioral structure followed the physical differentiation, while in less-differentiated common rooms the structure relied more on children's patterns of using the spaces.

Cultural/natural development, pedagogic concepts, and space

While space-use in learning situations followed cultural patterns, children's behavior showed similar characteristics across cultures. In a developmental context, how children experience space in interactional processes between adults (in this case in educational situations) contribute to the cultural development. Teachers' space use involves not only cultural *spatiality*, but also cultural concepts of individual/self. While self in the West emphasizes a psychologically, socially autonomous individual, it is linked more to the physical, bodily person in Japan. This could explain why there is relatively more emphasis on differentiating the behavioral experience of children in Japanese open-schools. How children relate with space in their immediate behavior is related to a culturally universal, natural development. The natural and cultural aspects of development interact and contribute to the development as a whole person.

Concepts and strategies in pedagogic practice are also related to children's experience of space. The reasons for 'opening' the spatial setting seemed to be different. Teachers in the Danish cases often assigned children to specific places so that they could work more efficiently in open space settings while in Japan it is normal that the open settings are meant to 'free' children from the classroom. According to studies on schooling, communication and control are more explicit/direct/verbal in Western schools while they are implicit/indirect/non-verbal in Japan. Perhaps, since communication is more non-verbal, space must be used more symbolically as part of communication in Japanese schools.

In conclusion

The observations and discussions point towards an area involving interactions between *culture, development, pedagogic practice, and space* to be explored further. The most significant implication of this research is that the interrelated, overlapped, nested structures of the socio-cultural environment are almost directly connected with children's physical and spatial experiences. An understanding of the complex relations around the experience of space shall be a useful tool for architects and teachers in dealing with space to create richer environments for children's learning.

1. INTRODUCTION

1.1 Aims and backgrounds

The general aim of the present research was to explore children's interaction with the physical environment with the school as the social setting. The school is a socio-cultural setting and the physical environment functions in relation with various aspects of the environment, as part of the total situation. There has been extensive research in the field of architecture over the years into children's interactions with the physical environment. However, there is relatively little insight into how children's relations with space are embedded in the context of school life.

It is necessary to view the school as a place where children 'live' in and not only as a place where they are transmitted knowledge and skills stated in the curriculum. The physical environment not only serves functional needs for educational activities but also has a significant relation with children's development and well-being. Teaching and learning activities can only be effective and meaningful in a place where children have rich social exchange, identity, and attachment. It was intended in this research to observe children's interaction with space and interpret the experience and meaning of space when it is inhabited and used in everyday life. Children's interactions with space were to be explored in a broad sense, including both active, immediate and passive, in-direct interactions. A socio-ecological model was used to analyze environment and behavior: what is the relation between social processes and space?

The research aims to contribute to current debates in Japan on improving the quality of school environments. School buildings in Japan are mostly institution-like buildings and do not have spaces for activities other than traditional class teaching. Movements in architectural planning from the 1970s and 80s, namely the open-plan and common rooms, did not succeed as intended. School buildings must change to accommodate diverse activities and must be friendlier and appropriate places for children's development.

Denmark was chosen for the research as a model for comparison and a source of inspiration. The research consisted of background studies on the Danish education system and history of school buildings, and field studies. Results of the field studies investigating children's behavior in space and organization of space in learning situations will be presented in this report. They are both aspects of children's socio-spatial experience in school, but they work in different levels.

Research structure

The research takes theories of learning and cultural development as a point of departure in an attempt to understand the connections between children's socio-cultural environment and the physical environment from an architectural perspective. The physical environment is regarded a significant factor in children's socialization and enculturation in school, together with other factors such as peer interaction, pupil-teacher relations, teaching material and program, and the surrounding community, that communicate norms and *systems of meanings* (Minoura, 1990). Learning in a broad sense is a process of accessing culture via constant interactions with mediators in the surrounding environment: people, artifacts, and settings (Saeki, 1995).

While these theories describe *structures* of the socio-cultural context children live in, they do not describe *processes*. Basically, focus is placed on what the elements represent, but not on

how they work. When we analyze the meaning of buildings we also tend to focus on what the built form represents, for example, as in Hillier and Hanson's space syntax (1984). However, it is correct when Dovey says, "meaning of both [behavior in space and architectural form] is based in everyday life, in dwelling. It follows that representations are not simply 'read', but are constructed through interaction" (Dovey, 1999: 51). Environmental behavior research deals with interactional processes between people and the environment. However in my opinion, there is relatively little interest in re-contextualizing the findings and interpreting their real-life meanings.

The report takes the form of an interpretive account of observational data. A socio-ecological model viewing the environment/behavior as interactional processes between social and spatial dimensions was used as the tool in structured observations and analyses (Figure 1). This model, frequently used in environmental behavior research, enables us to study events in the physical environment yet allows us to cross the border to understand their significance (Moore, 1986; Minami & Yoshida, 1993). I intentionally interpret, or 'read', much from the concrete observations since I think it is important to bridge lived experiences and macro contexts. Though there is a large amount of descriptive material on space-use and children's behavior in architectural studies in Japan, there is a lack of interpretation and theories for deeper understanding.

Two categories of children's interaction with the physical environment were identified for study with regard to the fact that the school consists of two different user groups, teachers and pupils. They are, *space in children's behavior*, that is how children make use of the environment, and *space in learning situations*, that is how teachers use and organize space in teaching. In the context of socialization/enculturation, I make a distinction that children's behavior is a form of *socializing* behavior, while teachers' use of space, by embodying cultural patterns, plays a role in children's *being socialized*. The two categories are first analyzed and discussed separately, and later brought together in the overall discussions.

Space-use in teaching was compared with Japanese schools, and differences were interpreted as representing cultural concepts of space owing much to geographer Augustin Berque's (1985) and architectural anthropologist Günter Nitschke's (1993) works. Children's behavior is discussed in relation with other works on children's behavior, based on the hypothesis that social processes are deeply related to behavior. The two parts are woven together in a discussion on the development of cultural self/individual and its' relation with space, drawing upon works in various fields dealing with the concept of self/individual in a cultural context.

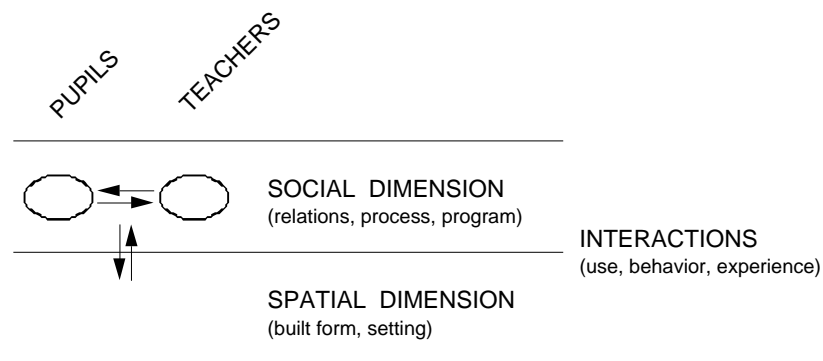


Figure 1: Socio-ecological model

Background: situation in Japan

School buildings after World War II in Japan were mostly corridor schools with classrooms loaded on one side of long corridors. Since the 1970s there has been a large concern in changing the school from a place of uniform, one-way teaching to where children can actively learn according to their different paces, interests, and needs. 'Individualizing' learning has been a keyword since. In terms of school design, it became popular in Japan to supplement classrooms with common rooms with an open connection with the classrooms (typically called 'multi-purpose space' or 'open space') for diverse activities. This was a plan type inspired by open-plan schools in England and America.

Today, approximately 10 percent of elementary school buildings have common rooms. 'Open school' usually means a school with common rooms. Although there has been extensive research into space and educational program (functional studies) and children's psychology and behavior (behavioral studies) over the years, open schools in reality did not work as intended except for a certain number of progressive cases. The problem has roots in different areas. It is partly because educational practice did not change as planners and architects had expected: normal class teaching remained dominant and/or, from a pedagogic point of view, the term 'individual' was interpreted to competitive, individual study programs instead of cooperative, creative activities (Sato, 1999). This point shall be referred to later in the discussions.

It is also because common rooms were usually designed to provide as much 'flexibility' as possible from a functional point of view, resulting in un-stimulating empty spaces. They are over-scaled and are not comfortable places, neither fit for children to work nor to play. Improving the quality of common rooms as spaces for various learning activities and as communal spaces for children is one of the large design issues in Japan. Since large common rooms continue to be made in new school buildings today, this research puts some emphasis on common rooms.

The recent movement in curriculum reform is aiming towards active, differentiated learning opposed to traditional class teaching. A new legislation placing focus on children's individuality and self-development is to come in effect in 2002. 'Integrated learning' (subject-transversal activities) will be introduced in the daily timetable. Parts of the program shall become flexible, and learning shall be incorporated in a more natural context. Children will have more chances of exploring the environment by themselves. The buildings must be modified to accommodate flexible ways of working but not in terms of a large open space. The experience from the open school movement suggests needs for different approaches to understanding functions of the environment and consideration from the children's perspective.

My previous research in Japan dealt with children's perception of the school environment and their behavior in an 'open school'. The findings revealed that the meaning of space was deeply embedded in the social context of school life (Itoh, 1999). For example, children had attachment to different places in the classrooms and common rooms reflecting their characteristics in social behavior. Children perceived openness of the building as possibilities to interact with children in other classes/grades. Openness of the building was also a symbol of the school's 'open' attitude towards education.

Though the school was one of the exceptionally progressive schools in Japan, there were some points that made me question the concept of 'openness'. For example, children were often free to work where they like, which (at least in Japan) is one measure of openness in teaching, but the task was not as free as it appeared in many cases. Another point was that children lived in an open atmosphere but they were under strong self-control to follow norms of school life. They did behave freely but knew how to do it 'properly'. They knew their school was a model project and were aware of the expectations. There was a strong encompassing school culture.

Such characteristics had a positive effect in this school but findings did suggest the need to further investigate how space works in relation with the social construct of schools. A model from a different socio-cultural context was needed. The main ground for studying Danish schools was that Denmark is generally considered a liberal, individual oriented society where self-decision and autonomy is given a high value. Danish schools should be a good source of inspiration for school programming and planning in Japan in terms of 'individualizing' learning.

School as a social context

Generally speaking, any situation different people share can be called a social situation. The characteristic of the school is that it is a social setting with characteristic structures. Children spend the day together and peer interaction is an important aspect of school life. Many aspects of school life are organized: there is a formal social structure of teacher-pupil relations and class/grade groups of children. Activities are planned and organized in learning situations. Space frames social relations in the various activities that take place.

There are many forms of social experience in school life. In this research I roughly make a distinction of two levels: *socializing* and *being socialized*. Children *socialize* in everyday situations by interacting with other children and teachers. Socializing is important not only that children develop social skills but also that it is linked to their cognitive development and identity. According to cognitive scientist Yutaka Saeki, learning happens in a dialogue between the child and the people and artifacts in the surrounding setting. The familiar and intimate people and artifacts children interact with mediate between children and culture. Since two elements must first be distinguished in order for a dialogue to be established, discovering self and *otherness* as a reciprocal process through social interaction is a fundamental context for learning and development (Saeki, 1995). Children's social exchange between other children and teachers takes place in space and can be enhanced or discouraged by the physical setting. The building itself can be viewed as a mediating artifact.

While *socializing* means immediate experiences of interacting with other people and forming relations, children *are socialized* in a longer time span. It is a process of learning social norms, developing identity and acquiring certain patterns of perceiving and behaving over time. Pedagogue Yasuko Minoura says elements of the setting such as educational material, the physical environment, teachers and peers express and communicate values and attitudes of the society/culture. A child is brought up in a society/culture (socialized and *encultured*) by being exposed to and interacting with the *system of meanings* embodied in the environment (Minoura, 1990). *Socializing* is a part of *being socialized* and the two levels interact.

It is widely agreed that the school environment has impacts on children's socio-cultural development. Yet we do not know much about how social processes actually function in physical space. How does space function in the interactions among children and between teacher and pupils? How is social experience incorporated with the physical setting and physical/spatial experience? The method taken here is to study transactional processes between social and physical/spatial dimensions of the environment in everyday situations. Space in learning situations was regarded a context for children's *being socialized* while children's behavior was regarded a *socializing* process and an active developmental task.

1.2 Process and method

Observations of school life were carried out in Danish *folkeskoler*. The focus of the study was originally placed on children's behavior. The educational program and teaching were to be

studied as well but were considered background factors. The differences in program and teaching from Japanese schools were expected to be functional issues rather than related to behavior and experience. However in the pilot observations, I noticed that even though there was more individual/group work and less normal class teaching compared to Japanese schools, it seemed that children were sitting in a traditional classroom setting for a large amount of the time, suggesting a different logic in space-use. This observation resulted in another category of data to be collected: teachers' use of space and patterns between activity and space.

On-site observations were conducted in four schools of different plan types. They were chosen as cases representing plan types characteristic at the time. One fourth grade class was observed in each school for a period of 3 to 5 normal school days in the period from December 1999 to March 2000. Observations were conducted in classroom and common rooms where children spend most of the time as their home. Activities in the classroom and common room were documented and the spatial setting for each activity was sketched and/or photographed throughout the day. Contents of activities and spatial settings were recorded every ten minutes during lessons, and later classified in types for a structured analysis. Behavior mapping (recording where children were and what they were doing) was conducted when children could choose where to work, and during breaks. Any events related to the use of the physical environment were noted. Special program days (*fag dag* and *tema uge*) in the Open-plan school and Village school were also observed in the same manners.

1.3 The four schools (All drawings are in scale 1:400)

- **Corridor school (building completed 1959)**

This was chosen as a traditional building in the sense that it was built before the ideas of open-plan and common room emerged. A long center corridor with classrooms on both sides runs through the building on each floor. There is a common room on the ground floor in the center of the building. The fourth grade class under observation was located next to the common room.

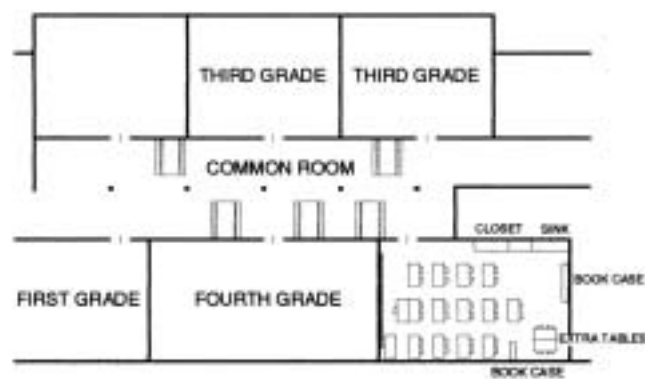


Figure 2: Corridor school

- **Open-plan school (building completed 1974)**

The school is divided in four buildings: lower grade (pre-school to 2nd grade and SFO –*skole fritidsordning*, middle grade (3rd to 6th grade), upper grade (7th grade and up), and the special classroom and office building. Walls dividing classrooms and a common space in the center were built in a renovation in the lower and upper grade buildings. The middle grade building continues to be used open-plan today. The middle grade building is arranged so that each class has its' own work space and a sitting corner in addition to the classroom. Each class' area is well separated from each other by furniture layout. The space in the center of the building is a common space shared by all classes.

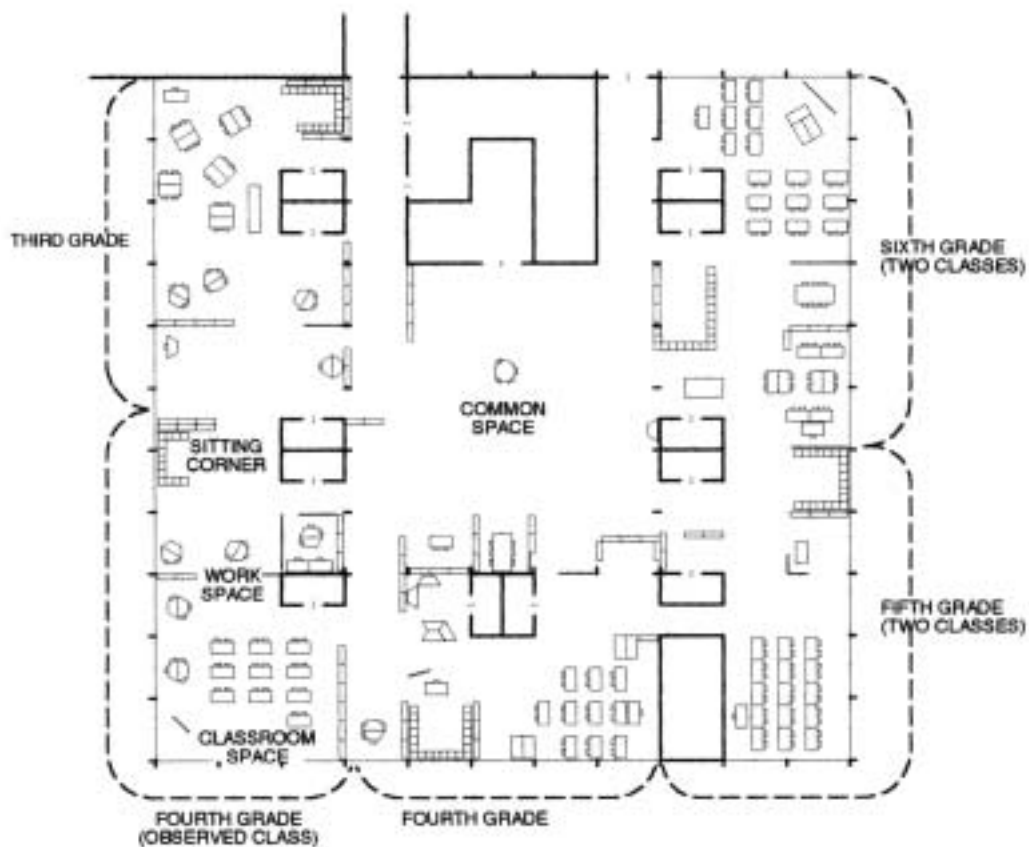


Figure 3: Open-plan school

- **Common room school (building completed 1974)**

This type was generally called *little school in the big school*. The characteristic of this type is that a large school is broken down in small units each with a common room in the center. The home class building of this school is divided in four clusters each consisting of ten classrooms (some are used as a work room or teachers' room) around a common room. The school has a 'twin school' that has an identical but mirror-wise building situated adjacent to it.

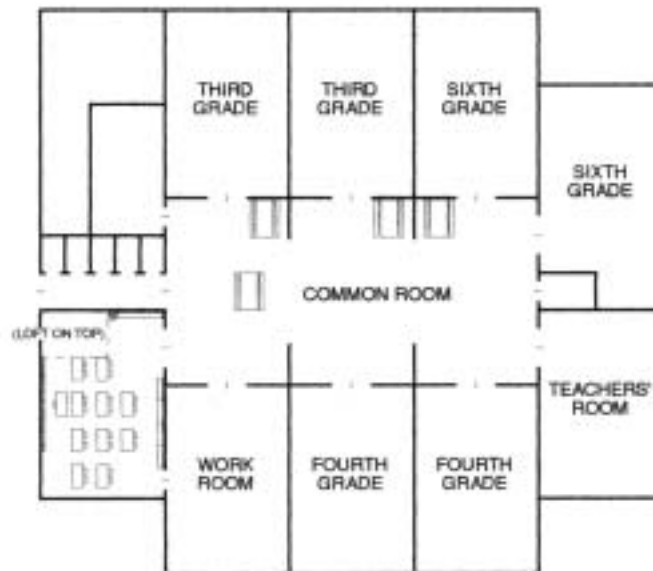


Figure 4: Common-room school

- **Village-structure school (building completed 1981)**

The school was designed to have a non-institutional character. It is divided in small buildings laid out in a village-like structure. The special classroom building and home-class buildings are placed around a main street and square. Paths lead in between the home-class buildings and continue to the surrounding housing area that was designed as an integrated scheme with the school. The U or L shaped home class buildings are divided further in wings that each have two/three classes and a common room. The common rooms are small niche-like sunken spaces.



Figure 5: Village-structure school

2. SPACE IN LEARNING SITUATIONS

Organization of space in educational activities

Learning situations were viewed as organizations of activity (teaching) and spatial setting, that construct the frame children experience space in. Observational data on teachers' use of space was analyzed in an activity x spatial setting matrix describing how (social) activity is associated with (physical) space. The activity x space combination was noted in ten-minute intervals during structured learning activities in the classroom locals: Danish, Math, History, Nature/Technique, and English lessons. Activities such as class-time, free-reading and special occasions such as decorating classrooms for Christmas, celebrating a classmate's birthday were not included. Approximately two-third of lesson hours was subject to this analysis.

2.1 Spatial setting

Most of the activities took place in either a *classroom setting* or an *open setting*. *Classroom setting* is the usual setting when children sit at their own seats in the classroom. It was the normal setting other settings derived from. Lessons usually started from the classroom setting and would shift later to open or other settings if necessary. *Open setting* is when the common room is used in addition to the classroom and children work at various places, that means children are working individually or in small groups. Many children preferred to work at their seats as well as other places in open settings. Other types of settings such as changing the arrangement within the classroom, moving the class to other places to sit together were occasionally seen.

Naturally, space was rearranged for activities that could not be done in the classroom setting: activities were assigned to places suitable for the work. In the second example, we can see every possibility in the classroom being utilized to provide separate work places.

Example of open setting, Open-plan school

The class is preparing for a field trip to a museum. Children study about the artists and their works. Children can chose between writing an essay about the artists, painting a picture inspired by the artists' work, and reading further.

After a class discussion in classroom setting, children start working in an open setting. Those who write work at their seats in the classroom. Those who paint work at tables or on the floor of the work space. Those who read sit in the sitting corner.

Danish lesson, Corridor school

The class reads a story together. The assignment is to first write an ending to the story by oneself, and then read it to another child, discuss, and re-write the ending together. The teacher joins two children who finished writing their stories and moves them to different places in the classroom so that they could read out and discuss without disturbing and being disturbed by others.

The teacher joins the first two children who are ready to work together and move them to the extra table in the back of the classroom. The teacher takes a table from the extra table (two tables were put together), makes another place, and moves the next pair there.

A boy sitting near the back of the classroom tells the teacher that he cannot concentrate because other children are talking behind him. The teacher tells him it cannot be helped because they are working, but that he can move to a quiet place. The boy moves to an empty seat in the front of the classroom.

The next two children move to the kitchen sink and work there. The next two move to a window bay and work on the sill. The next two move to an empty seat...
This class does not use the common room because “there is always people walking through the (common) room and it is not a good place for children to work” (teacher’s comment).

Spatial settings have *functional* and *symbolic* aspects that are integrated in actual situations. For example, an open setting functionally enables a wide range of activities and symbolically, as seen as an opposition to the traditional classroom setting, means children have more independence and control. As space was functionally rearranged in the above examples, relations between the teacher and children and among children symbolically shifted to more informal ones in physical space.

In some cases teachers changed the spatial setting for tasks that could have taken place as well in the classroom setting. (They did not necessarily have to be done in the classroom either.) In such cases, we may say the use of space was symbolic and the significance was in providing an atmosphere more suitable for the activity than the classroom setting.

Examples from the open-plan school

Teacher moves class to the sitting corner for story telling. The corner is enclosed by low bookshelves and small boxes children could sit on are arranged in a U-shape. Children sit shoulder to shoulder in a small circle and listen to the teacher.

Children are solving math problems. Some girls ask the teacher if they could work at their favorite places. The teacher allows them to do so. One group goes out of the classroom and uses a low-height drawer in the common room as a table. One group goes to a table behind bookshelves. Other groups go to tables in the back of the classroom. The teacher says, “the children like working like this”.

There seemed to be more intimacy and a sense of participation than in the normal classroom in the first example. Children in the second example took initiative and created a comfortable work situation for themselves. They had more control over themselves and could have ‘their’ place and sit together with friends. The change in space would change children’s experience of the total situation. From the children’s perspective, the meaning of the spatial setting is sensed directly from the physical experience and the frame of behavior rather than be ‘read’ as a symbol as it would be by an observer.

Though *space* always has both functional and symbolic aspects, the main criterion deciding the *use of space* could be either of them. The logic in space-use could be functional or symbolic. It was observed in the four schools that the relation between activities and space was basically functional. That means space was mostly used to respond to practical needs rather than to change the atmosphere. The following analysis illustrates the point.

2.2 Activity and spatial setting analysis

Activities were categorized in *class* activities and *individual/group* activities by the size of the instructional group. They were further divided in sub-categories as follows.

A: Class activities

A1: Normal teaching and instructing

A2: Discussion, presentation, listening to stories etc.

B: Individual/group activities

B1: Exercise –solving math problems, practicing spelling and grammar etc.

B2: Writing / reading –writing essays or reports, reading an assigned text

B3: Practical work –drawing, making things, theater, group discussion

B4: Project work

In *exercise* and *writing/reading* children work separately but on the same topic/subject. They are both ‘seatwork’ using books and notebooks. However, children work on open-ended problems in *writing/reading* while they focus on particular skills in *exercise*. *Practical work* usually requires a larger space than the classroom desk. *Project work* is a special category. Children work on different topics/subjects and different ways of working take place at the same time.

Lessons were organized as sequences of situations. It was typical for Danish and Math lessons that the lesson first started in class teaching and then moved on to exercise or writing/reading. On *fag dag* and in *tema uge*, the whole day or week was organized in a longer sequence. For example, on a *fag dag* the first two lessons were *class activity* (reading a story together), the third and fourth lessons were *project work* in an open setting, choosing between making a theater, making a collage, and making a theater. The afternoon was *class activity* again, this time presentations of the work they had done.

Approximately half of the time on normal days was spent in class activities and the other half in individual/group activities during the observations (Figure 6). Class activities took place in classroom settings. Individual/group *exercise* and *writing/reading* generally took place in classroom settings and *practical* and *project work* took place in open settings (Table 1). This indicates that practical (physical) needs of the task were the factors deciding whether the space was open or stayed in the classroom setting. Spatial setting was open when there were needs to work at different places (such as needs for larger tables or acoustic privacy) but remained in the classroom setting if the task was seatwork. This also means that open settings meant the work was open-ended (children seek their own answers) and individual/group work in classroom settings was program learning (children seek correct answers). Open-ended learning was often incorporated with creative work or group work, therefore requiring an open setting, while program learning was always seatwork and did not require a different space.

2.3 Comparison with Japanese schools

Space and activity in Japanese schools

In the Danish schools, there was much individual/group work on a daily basis compared with Japanese schools in general. Normal class teaching is still dominant in most Japanese schools. Another point of interest was that there was much practical work, especially group work in Danish schools. Differentiated teaching is practiced actively in certain progressive schools in Japan but there is more individual exercise.

Spatial setting and activity in Japanese schools can be categorized in the same way as in the Danish cases. However, while the relation between activity (program) and space was *functional* in the Danish cases, it is more *symbolic* in Japanese schools. The contrast appears in

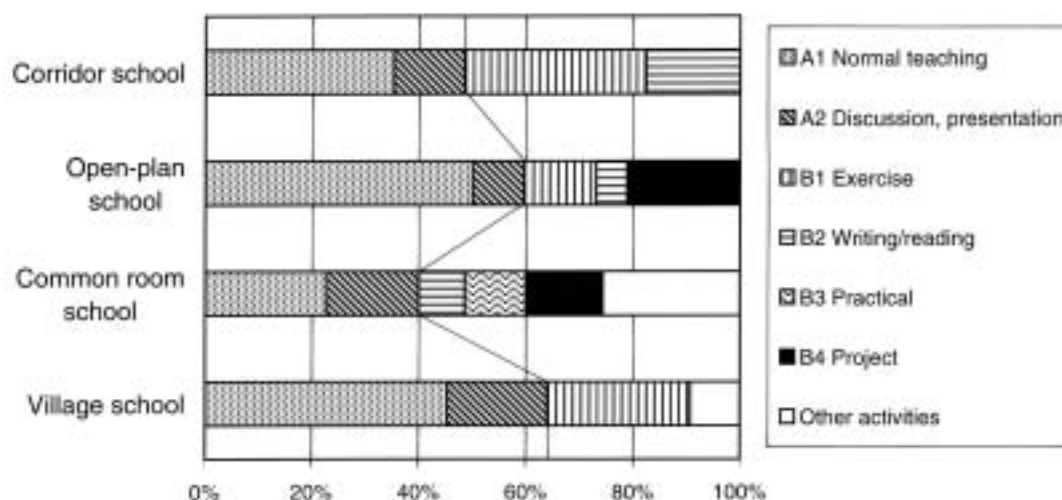


Figure 6: Percentage of time spent in activity types (normal days, in classroom locals)

This shows approximately half of the time in classroom locals was spent in individual/group activities and the other half in class activities. This figure provides an overview of what space in classroom locals was used for, but it should NOT be read as an evaluation of the educational program. This is a result of short-term observations and the contents and amount of activities differ according to the schools' plans, when the observations took place in the year, and spatial conditions.

Data collection in the Open-plan and Village schools were carried out just after a fag dag or tema uge, that means the children had just finished a project at the time. Children in the Common room school were finishing a project during the observations; therefore much time was spent in presentations, practical and project work. Children in the Corridor school were working on a project in Nature/Technique in the special classrooms which was not subject to the activity x space analysis.

Table 1: Activity type x spatial setting patterns (normal days)

	Classroom setting	Open setting	Other settings
Danish cases			
Corridor school	A1, A2, B1		B2
Open-plan school	A1, A2, B1, B2	B4	
Common room school	A1, A2, B1, B2	B3	
Village school	A1, A2, B1		
Japanese case			
	A1, A2	B1, B2, B3, B4	

Activity types

A: Class activities

B: Individual/group activities

A1: Normal teaching
 A2: Other class activities
 B1: Exercise
 B2: Writing / reading
 B3: Practical work
 B4: Project work

individual/group work situations. *Exercise* and *writing/reading* took place in classroom setting in Danish cases, but they tend to take place in open settings in Japanese open schools when differentiated teaching is practiced. That means spatial setting tends to be *open* in any individual/group activity whether it is practically needed or not. This is a recently recognized tendency in Japanese schools. A research on the use of common rooms in Japanese schools reports that there are increasing situations in which the learning itself is standardized but children are free where to work (Kurakazu & Ueno, 1999). From a pedagogical view point, this is criticized as open school buildings being used for competitive, programmed learning in a seemingly open atmosphere (Sato, 1999).

In my observations in a Japanese school known for its' progressive teaching, approximately half of the time was spent in individual/group work and children were always told they can work where they like in those situations. However, the activity was mostly *exercise* that, in the Danish cases, would take place in a classroom setting. See Table 1. Spatial setting was open whenever children were not instructed collectively. Classroom setting meant class activities and open setting meant individual or group activities. Space was associated to the form and size of the instructional group and not the contents of the activity. Children would often be sitting freely but working on a same task.

For the children, working by themselves meant sitting where they like. The common room was associated to behavior (ways of being in space) and not functions (what they do in the space). The teachers said, "now you can work where you like" when class instructions were over and children were to start working separately. A boy described the common room as a place where "we can sit wherever we like" in an interview though he had explained other places by their functions such as reading, playing, or 'my place'.

Relations with space and 'spatiality'

In the Japanese case, change in the spatial setting was a signal indicating a change in the activity. Individual work literally meant individual choices of work places. By letting children sit where they like, teachers told children via their physical experience that they were not handled collectively and they were by themselves. This represents a *symbolic* relation with space: space was used to communicate a message. Children were differentiated in their experience of physical space but not necessarily in their tasks.

In the Danish cases there was a more pragmatic attitude towards space. Spatial settings followed practical needs in the activity. It was open when children needed more space for the task. This represents a *functional* relation with space: space was used as a tool in the physical space. Learning was differentiated in social space, but not necessarily associated with physical space (Figure 7).

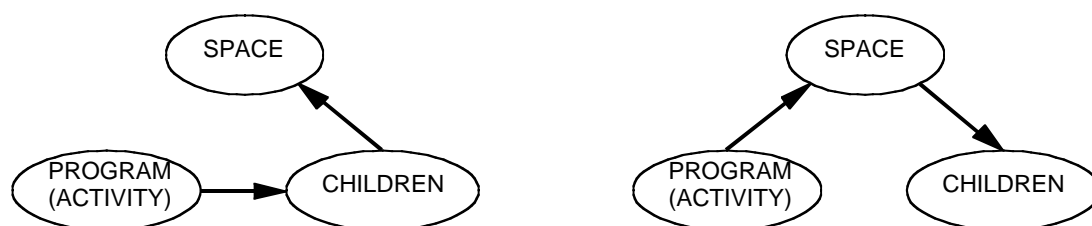


Figure 7: Relations with space

*Left: Functional relation -program requires children to use space in certain ways.
Right: Symbolic relation -certain arrangements of space signals program to children.*

There are many possible factors affecting the use of space. Teachers have different teaching styles and each school has its 'school culture'. For instance, it was the teacher's choice in the Corridor school not to use the common room while some classes used it more often. Whether consciously or subconsciously, pedagogic intentions affect the use of space. When we consider that 'individualizing' children has been a keyword in education in Japan as a counter measure to the so-called uniformity of Japanese schools, it could be possible that the most progressive schools tend to 'individualize' children in every possible dimension. In terms of space, though only a limited number of cases have been studied, I hypothesize that the patterns in space use are also related with cultural concepts of space. There seems to be a logical connection between the patterns in space-use in the schools and general patterns in the relations with space in the West (Denmark) and Japan.

Geographer Augustin Berque calls culturally defined relations between concrete (physical) space and abstract (social) space *spatiality*. Spatiality defines how space is perceived, organized, and used in a certain culture. Generally, due to the relatively weak position of the subject and the weak distinction between subject and object in Japanese culture, social substance (abstract space) and physical form (concrete space) are not separate entities. They are directly, often literally, associated (for example, *house* means *family*). Space and social organization are closely related and often viewed as having direct connections. In the West, space is objectified as a physical entity. Social substance and physical form are viewed separately. While the social substance is essential in Western culture, form and appearance are regarded a part of the social substance in Japanese culture (Berque, 1985).

From this point of view, we can interpret that *space* being open was (probably subconsciously) treated as part of the *learning* being open in the Japanese case. There was a formality in space-use in the Japanese case that the classroom setting was avoided (it symbolizes collective, monotonous teaching) and the space was opened as much as possible (it symbolizes individual, differentiated learning). Children may have a richer experience in space but the risk is that teaching could only appear 'open' without a substantial change.

Another related point Berque makes is that immediately perceived, concrete reality is valued over abstract in Japan. We may assume that space in the Japanese case was used to visualize the 'openness' of education and to provide children with freedom in physical space that could be immediately sensed in reality. In Günter Nitschke's terms (he has carried out anthropological survey in Japanese architecture), space was a *time and mood-structured* process (Nitschke, 1993a). The message was conveyed not only in the physical layout but also by manipulating children's physical/spatial behavior in a specific time-context.

It is common in both Danish and Japanese contexts that children have more control over themselves and their relations with the environment in open settings. The shift in spatial setting is accompanied with a shift in the behavioral space. However, what they mean in the learning activity are not the same. Since spatial settings showed *concepts* of open/closed education in the Japanese case, they did not necessarily correspond with the function. Spatial settings followed *functions* of educational activities in the Danish cases. The mental task would be emphasized as the core of the learning activity in the Danish cases. Physical freedom and movement would be a large part of the experience in the Japanese case.

3. SPACE IN CHILDREN'S BEHAVIOR

Children's use of space and its' social implications

Behavior in space is a mode of child's relating with the environment. Placing oneself in space, for example by choosing where to work or playing at a 'favorite' place, is an aspect of control over oneself and of individual (or group) consciousness. Fixed features of the physical environment can be read as expressions of social concepts. The building plan and classroom layout represent a social order. The classroom is designed as a private space for children who belong to the class, and the common room as a public space. Small niches and corners are designed to offer privacy in a larger space. At the same time, there is a social structure in space that becomes apparent only when children occupy the space. It is visualized by behavior that takes place.

The basic assumption here is that social relations and identity are deeply connected with space. Geographer Yi-fu Tuan describes the parallel process of segmentation of space and the development of individual consciousness. It is the need for individual consciousness to develop a self-space and to have a place away from collective life (Tuan, 1982). Privacy is a basic human need to control openness/closedness to others and it is regulated in space by behavior processes such as territoriality (Altman & Chemers, 1980). Physical layout influences relationships between individuals/groups and all individuals have a place-identity and remember, are familiar with, and like certain places (Wolfe & Proshansky, 1974). There are numerous studies on relations between social aspects of the environment and behavior.

It was intended in this part of the study to find characteristic patterns in children's behavior and use of space, and interpret their meanings in a social context. Behavior mapping was carried out every ten minutes recording where children worked/played and what they did when children could choose where to work during lessons and during pauses. Movements of children from one location to another during observation intervals were also noted. Which class or grade children belonged to were noted on the map as accurate as possible in order to examine the social structure of the scene. Distinctions between children from the visited class and other classes were at least maintained.

Patterns ranged from general characteristics in behavior to characteristic scenes or use of space that occurred repeatedly in specific locations and/or contexts. The patterns were inter-related and actual scenes that took place were combinations of different patterns. Descriptions of general characteristics are based on overall observations of the schools and observations at various parts of the buildings are included. Location/context specific patterns were observed around classrooms of the visited classes. They concern territorial and group related behavior such as patterns of contacts between children from different classes/grades that implied a shared recognition among children that they belong to certain classes associated with certain places.

3.1 General characteristics

Children usually did not stay in the middle of wide open spaces unless they were doing something that required the space, such as dancing, painting a large picture etc. They would stand close to the edge of the space or objects such as tables, bookcases, pot plants etc. when they were not engaged in a particular activity and were 'hanging out'. Small children were seen standing or sitting very close to objects. They seemed to hold on to objects as a reference point

to ‘anchor’ themselves in a large space. For example, tables in the middle of common rooms collected many children during pauses. Children would gather, talk, and watch other on-going activities in the common room. Several children (or groups of children) occupied the tables at the same time, often without any interaction between them.

Place-making

Children created comfortable places by using architectural elements (columns, steps, windowsills, handrails, built-in benches etc.) and furniture. In some cases the solid, physical features of the elements were used by itself, for example to sit or lean on, or as stands for working or playing, or as perch for gathering. In some cases the children occupied spaces bordered by elements, for example spaces between a column and a wall, between two tables, a window bay, for talking, playing, or just sitting. The physical object/element could be seen as the gestalt in the background space, or as a frame emphasizing the space as the gestalt.

Children did not only use fixed features of the environment but also arranged it by themselves. They often made small places by arranging furniture close to corners and niches, sometimes in a light pond. This was seen sometimes as carrying a chair to a favorite corner, but more often as moving a table just slightly closer to a corner or a window and adjusting the angle so that it fits in the place.



Scene framed by the window



Using the window



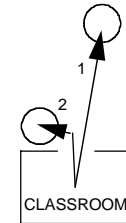
In a light pond

Keeping distance / keeping contact

Children often preferred to go to places away from their classrooms. However, they often chose places where they could keep visual contact with the classroom. In such situations, they would have a distance from the classroom, which was usually the center of the activity, but not be isolated.

Corridor school and Common room school

In several open-setting situations during lessons, the first children going out from the classroom did not choose the closest table but went to a farther table that had direct visual access to the classroom through the doorway. The second group would then go to the closest table, usually in a blind angle from the classroom.



Choice of tables

In the Open-plan school

Two girls, told they could work where they like, went to a table behind the shelves that separated classrooms. Instead of working at the table, they put chairs on top of the table and worked standing on the chairs using the top of the high shelf. They were overlooking the classroom while they were working and occasionally chatted with friends below in the classroom.

Behaviors in the above examples are practical in the sense that children can always see what is going on in the classroom. This may not be central but is an important form of participating in a situation. We could assume that this behavior is related to individual and group consciousness. Children can sense independence (by being away from the class) and belonging to the group (by seeing the connection with the class) at the same time.



Watching the classroom over the shelf



Keeping visual contact with the classroom

3.2 Location/context specific behavior

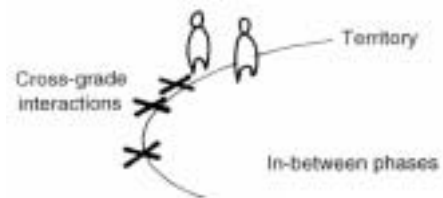
Territory

Children almost never entered other classrooms, even those of the same grade. Certain areas in common rooms, usually areas in front of classrooms, were used solely by children of that particular class. Other grades seldom entered these areas. Children tended to stay in these territories of their own class when they did not have particular things to do in other places. Edges of territories were marked by where interactions between children of different grades (cross-grade interactions) took place. Cross-grade interactions mostly took place at the border between class territories and areas of public character that were used evenly by children from different classes.

In-between phases

Children often paused and gathered around the entrance of classrooms on their way out or back. They congregated, waited for friends, watched other activities go on in the common room until they went out to other places or back into the classroom, or started something by themselves. This seemed to be important, since various activities started from and cross-grade interactions often happened in this phase. Similarly, this pattern is described as thresholds of various rooms becoming a 'pausing place' where children stop by and form relations (Vecchi, 1998).

Territory and in-between phases were closely tied with each other. In-between phases took place in territories and an important function of territory was the in-between phase. Territory was an intermediate zone between the home classroom (private) and common space (public) where children connected with areas outside their classrooms.



Cross-grade interactions

Children had little deep engagement such as long conversations or playing together with children from other grades in the common rooms. Cross-grade interactions were mostly brief 'saying hello' or watching another group work or play. Even when they did talk, the different grades did not mix and kept a physical distance. Talking and watching/being watched interactions between different grades usually happened across a distance or a boundary/threshold such as doorways or handrails or different floor levels. In such 'I am here, you are there' situations, one group occupied one place and the other group occupied another. The social relation between them was structured as a spatial relation.

In Corridor school

A group of fourth graders are talking with older students (perhaps 7th or 8th grade) in the common room. The two groups were first chatting separately at each table but eventually started talking with each other. However, instead of joining the other (like they would do with friends from the same grade) they stayed at each table and kept distance. The table the 4th graders were sitting was a fourth grade territory, and the table the older children were sitting was a public place.

Cross-grade interactions in Village-structure school

The common room is a sunken space few steps lower than the corridor and classrooms. Fourth graders shared the common room with fifth graders. Most cross-grade interactions between fourth and fifth graders happened between two floor levels as watching/being watched interactions. One group would be playing or working in the sunken space and the other group would be watching them from the upper level. Fourth and fifth graders were on different sides and were not in the same area at the same time.



Watching / being watched

3.3 Behavioral structure of the common rooms

Behavioral structures of the common rooms were examined by registering location specific patterns on the plans. In summary, class territories and shared spaces were physically differentiated and did not interfere with each other in the Open-plan school and the Village school. Or we could say behavior patterns followed the physical differentiation of space. In the Corridor school and the Common room school, there were no strong elements physically differentiating the common rooms, and separation of territories and shared spaces relied on children's behavior.

Corridor school and Common room school

Common spaces of the Corridor school and the Common room school were square rooms outlined by 'hard' walls. The common rooms were not spatially differentiated except for tables or low partitions (in the Common room school). The area in front of each classroom became the class territory during pauses taking up pieces of the common space.

In the Corridor school (Figure 8), the table right outside the fourth grade classrooms (B in figure) was used only by fourth graders. They also used the table next to it (A) and the one across the room (C) much. These two tables were used also by children from other grades including those from other parts of the building. Cross-grade interactions between fourth and other graders happened at these two places. Table B was in fourth grade territory while tables A and C indicated the outskirts of the territory.

In the Common room school, each class had a bay in front of the classroom separated by added partitions. Each class' bay would be the class territory during pauses. Children mostly stayed within the boundary implied by partitions. Tables within class territories were used only by the classes they belonged to. Only one table in the middle of the common room was shared and most cross-grade interactions happened there.

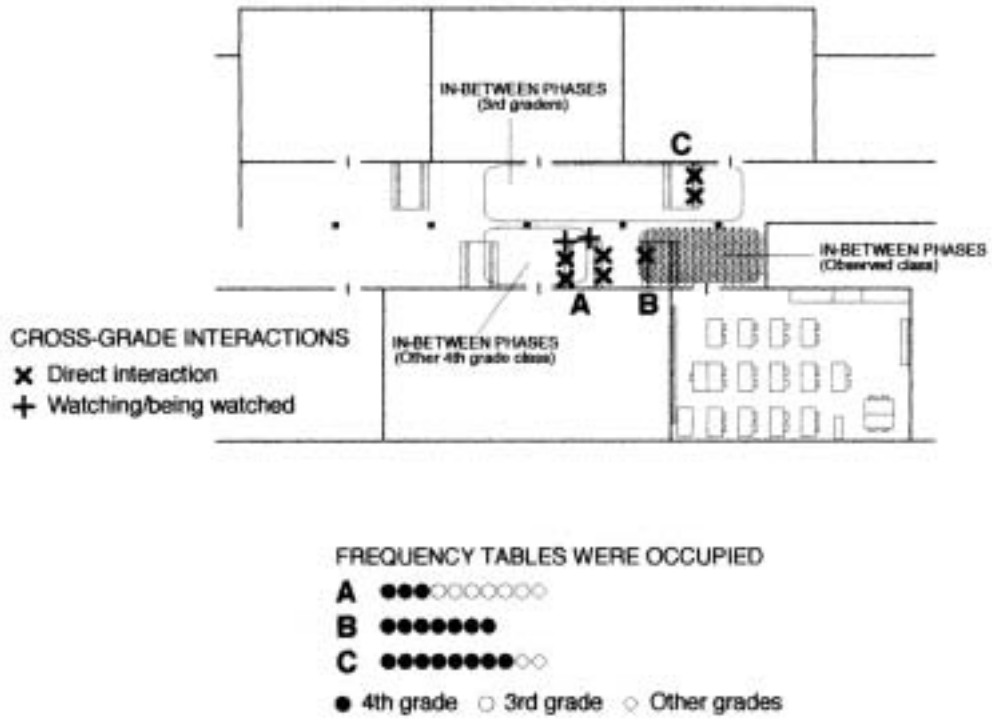


Figure 8: Behavior map, Corridor school
Registration of 18 observations during pauses

Open-plan school

The open-plan was clearly divided into classroom and work space areas belonging to each class and a common space in the center by furniture layout. Most of the activities took place within the class area and the common space was used mostly by 5th and 6th grades.

Borders between class areas and the common space were, since there were no walls and doors separating the spaces, soft connections arranged by furniture cutting direct visual access. The threshold between class areas and the common room were thick, soft edges. Not walls that draw a strict distinction between both sides. One walks through a path into the work space first and then to the classrooms when entering fourth grade areas.

In-between phases occurred at coat hangers placed at the thresholds between class spaces and the common space, and in the path leading to the class spaces. Cross-grade interactions took place around the coat hangers. Children from other classes would not go further from the threshold areas into class spaces. The common room had a public character and no places seemed to be a particular class' territory. The table in the center was often a pausing spot on the way out or back from the class spaces. In-between phases and cross-grade interactions often occurred at the table.

Village-structure school

Two fourth grade classes and a fifth grade class shared the common room. The fourth grade classes had better access to the sunken common room and "the children feel it belongs to them" (a teacher's comment). Fourth graders would often sit, talk, play, eat in the common room and the bench on the upper floor level in front of the classroom during pauses. In contrast, fifth graders would not come to the sunken space much. They watched the common space from the stairs leading down to the space or from the bench. They would occasionally come in to the common room but in those cases would be running through the room or wandering, and would not stay for a long time in a stable activity.

Teachers' control of classroom doors also indicated that fourth graders had priority to the common room. The door of the fourth grade classroom was normally open, and closed only when the other fourth grade class or the fifth grade class was using the common room. In contrast, the fifth grade classroom door was closed unless they were using the common room.

Most cross-grade interactions between fourth and fifth graders were watching/being watched contacts between the bench on the upper floor level and the sunken common room. This type of interaction happened very often between children in the same class as well (Figure 9). Fourth and fifth graders were not in the same side of the space at the same time in pauses. It was mostly the fourth graders that were in the main part of the common room (the lower floor level). It was obvious in the behavior that the two grades had a strong awareness of which group they belong to, and the fifth graders did not act as the common space was theirs (see example of *cross-grade contacts*, p.18.)

3.4 Behavior patterns and social experience

Individual / group consciousness

Children controlled their relations with other children by adjusting their position in physical

space. They adjusted their privacy and independence to a desired degree by the distance and visual connection with other children and teachers. One of the most conscious acts of controlling relations was keeping distance/contact behavior of children who wanted to talk in private. The children would often talk in the common room, instead of going to a hidden place, and keep an eye on the classroom and other possible access to them so that they were sure they were not heard. Various studies report behavior similar to keeping distance/contact (Curtis & Smith, 1974; Yanagisawa, 1991). They indicate children's needs for privacy and at the same time not being secluded. This behavior is a balance of privacy and individual consciousness, and participation and belonging.

Behavior patterns expressed different levels of individual/group consciousness. They were forms of social relations structured in physical space. *Place-making* were ways of articulating a 'my' (or 'our') place. *Keeping distance/contact* emphasizes a relation between group and individual. The child makes an individual place in relation with the group place he/she belongs to. *Territory* and *cross-grade interactions* are based on group identity. The patterns represent the social organization of class/grade groups in physical space. Whether consciously or subconsciously, children combine various levels of social relations in their behavior.

Group identity seemed to have a stronger control over children's physical behavior in forms of *territories* and *cross-grade interaction* when it is reminded by being in a place associated to it and/or by the presence of others.

There were clear territories during pauses, but children seemed to be free from them during lessons. In learning situations, children did not hesitate working in other classes' territories where they would not enter during pauses. For example, children often sat at a table in front of another class in a *keeping distance/contact* structure. In the Corridor school and the Common room school, children freely used tables in front of other classes they would not sit at during pauses, for group work or reading. In the Village-structure school, fourth and fifth graders used the common room evenly in lessons, sometimes working at the same time.

The obvious reason that territorial behavior was not seen in learning situations was the limitation of work places. Since there were only a limited number of tables in the common rooms, there was no choice but to use all available tables including those in other classes' territories. Another factor could be the absence of others. Common rooms were usually used by only one class at a time during lessons and other children would not have to co-occupy the space with other groups. Territories may be structures that appear upon the immediate presence of different groups.

Though children from different grades usually interacted across physical or implied borders in classroom and common room locals, they often mixed outside those areas. Children from various grades playing together were often seen outside the home classroom areas and especially outdoors. Some children had close friends in different grades whom they often spent time with during pauses and lunchtime. When they wanted to play or eat or just talk together, one of the children would come to the others' classroom and then go out to another place together. They would not stay near either child's classroom (observations in Open-plan school



*Individual, individual-group, and group-group structures (from left to right).
The drawings can be read both as spatial and social structures.*

and Village school). Children may feel a stronger belonging to the home class and therefore feel stronger borders between grade levels when they are near their classrooms, and are freer from the group identity when they are in other places.

This must be discussed further in a developmental context. Though keeping distance/contact was a characteristic pattern observed in fourth graders, older students were often seen working at places out of the range of direct connections with their classrooms. They may be less affected by and less dependent to the needs of sensing individual/ group identity in space. Fourth graders, in comparison, may be in a stage when their social consciousness develop rapidly, and are connected relatively stronger to physical/spatial experiences.

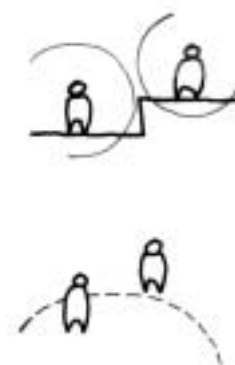
It must also be noted that some children seemed more aware of space than others. It was often the same children who preferred to work in the common room when allowed. Some children moved to different places and adjusted the physical setting more often than others. In general, girls seemed to have stronger attachment to particular places, did more place-making, and wanted to work outside of the classroom.

Physical / behavioral differentiation of space

Common rooms of the Corridor school and Common-room school were poorly defined spaces. Circulation and playing/working spaces were not separated and there were not many places to feel secure in or elements to hold on to. Despite this lack of physical articulation, there was a social structure of space clearly indicated by territorial behavior and cross-grade interactions. Children behaved in a way securing 'their' places and respecting others'. Space was articulated by children's behavior.

The ways children occupied places and interacted with other children visualized borders, enclosures, and relations in spaces that were not articulated by physical borders. That is visualizing 'my' or 'our' places in a larger space. As in the case of cross-grade contacts, social interaction occurred at edges of 'my' or 'our' places. A study on group interactions showed that cross-grade interactions occurred at outskirts of where students considered their semi-private space, and that this pattern was observed only when other graders recognized this territoriality. The territorial structure in space was not constructed by architectural differentiation but by a shared recognition by students of different grades and their behavior (Minami, 1993). It is possible that there was a shared recognition of territories reflected upon the behavior maps in the cases in this study too.

It is reported that a higher degree of engagement in activities and social interaction among children and more cooperative behavior were observed in architecturally well-defined settings in pre-school child care centers. The positive effects of well-defined settings were attributed to visually and acoustically separated places supporting for less interruptions and longer attention spans (Moore, 1986). While places for activities being appropriate in scale and well separated from other places is important, it could also be assumed that the borders and thresholds articulating space are as well of importance as a device creating a physical situation for social interactions. For example, increased interactions between children occur across boundaries (Yanagisawa, 1991). In the Village-structure school, many interactions between children, both in the same grade and with other grades, took place between different floor levels.



Physical differentiation and differentiation by behavior

Space was differentiated physically (architecturally) and in behavior. While physical differentiation supports and enhances social interactions and guides them in a certain spatial structure, behavioral differentiation is a result of children's everyday actions to construct stable social situations. Behavioral articulation of space appeared temporary in actual scenes but could be realizations of a psychological structure that regularly controls children's behavior. The observations here suggest that many social interactions occur at boundaries between either physically or behaviorally separated places. Perception of the boundary, either visual or psychological, regulates children's behavior and enhances consciousness of this side and the other side, self and otherness.

4. DISCUSSIONS

We have examined children's interaction with the physical environment in two levels. Teachers' use of space was studied in order to understand the organization of settings children experience. That means, how space is provided to children. Patterns in space-use were interpreted, by a comparison with Japanese schools, as a cultural frame in which children experience space. Children's behavior in space was studied as a process related to the development of self/group consciousness that appears in immediate interactions with the environment. The underlying theme throughout the research was to analyze space and its' social meaning in schools.

4.1 Lessons for Japan

Teachers' use of space creates the frame children experience space in. Not only that the spatial setting itself has functional, symbolic, and behavioral meanings, the findings illuminated concepts behind teachers' space-use as culturally defined patterns. Though a general conclusion on space-use in Danish and Japanese schools should not be drawn here, the case studies provided us with models representing functional and symbolic uses of space as a starting point to investigate space in a cultural context.

I do not intend to say that space was only functional in the Danish cases and only symbolic in Japanese schools. The contrast in teachers' space-use displayed different balances of two ways of relating with space. Symbolic use of space was observed in the Danish cases too. However, teachers seemed to be more aware that they were handling space in that way. In a context where the functional aspect of space is more apparent, perhaps the occasional symbolic manipulations of space have stronger impressions and effects on children's experience than in a context where space-use is normally symbolic.

Open spatial settings have much behavioral significance. Having the freedom to choose their ways of 'being in space' means much in their social development and identity. As explored in this research, spatial behavior is a form of expressing social consciousness. Children develop attachments to certain places as part of their identity (Itoh, 1999) and also perceive themselves differently when they have more freedom in their physical behavior. Students feel responsible and control over their work when they could choose their own working place, in contrast to referring to themselves passively when mentioning classrooms (Skantze, 1989).

The problem in Japan is that this symbolic and behavioral level of 'individualization' is literally associated to differentiated learning. The comparison of Danish and Japanese cases clearly illustrated that diversifying activities and diversifying behavior are different dimensions of pedagogic practice. Children sitting where like does not mean that they are doing what they like, or vice versa: sitting in the classroom does not necessarily mean they are educated uniform and monotonously. Though it is a positive move to give more control to children, it is never substantial if the activity itself remains uniform. The lesson for Japanese teachers, pedagogues, architects and planners is that we must first recognize the different dimensions of learning situations and our subconscious ways of viewing the environment before giving only apparent control to children.

4.2 Concepts of individual/self

The term 'individual' is used quite freely in this report. 'Individual' is usually connected with concepts of self that was nurtured in modern Western society (Tuan, 1982). Japanese society is frequently referred to as a group-oriented society compared to Western societies that are individual-oriented. According to Nitschke, while "a person is conceived of as a flexible and easily linkable *dividuum*" in Japan, "the Western mind has tended to envisage the human being as a perfect and self-contained *individuum*" (Nitschke, 1993a: 58). Social anthropologist Chie Nakane describes that in Japanese society small groups are equivalent to and function as the Western individual (Nakane, 1978). The keyword 'individualizing' in educational reform in Japan is based on the self-conception that the Japanese are homogeneous and lack 'individuality'.

However, social critic Masakazu Yamazaki, referring to the fact that there have been many arts of self-expression in the history of Japanese culture, suggests a tendency of individualization in Japanese culture as well. 'Individual' in this context means a consciousness of oneself as a separate person. He argues that distinguishing individuals as separate persons must be a universal process in any culture but not as the self in the Western sense. In contrast to the Western self as the center of the world, the individual in Japanese culture seeks reference for his/her identity in the surrounding society. In Japan, individual means separate persons but not necessarily a socially and psychologically autonomous self (Yamazaki, 1990).

Tuan (1982) contrasts the self in Western culture separated into mind and body with the self in non-literal cultures that is an existential whole. Ulrich Neisser, psychologist, contrasts the *ecological self* that is embedded in the real ecological and social environment to the self which philosophers and psychologists (in the West) had pursued in the head. While mind and body, person and the environment were once separated in the West, the borders between them were not strictly drawn in Japan (Berque, 1986). For example, architectural devices of traditional tea pavilions are designed to increase one's consciousness of oneself by manipulating the physical/spatial movement and experience (Nitschke, 1993b), indicating a relatively higher value in the bodily self.

Space-use patterns in the Danish and Japanese cases seemed to follow this schema. In the Danish cases, differentiated activities came first, implying an emphasis on the 'mind' dimension and psychological autonomy. In the Japanese case, 'individualizing' in the physical dimension played a larger role implying stronger emphasis on the physical/spatial experience. Individuals are first handled as different bodily beings.

In learning situations, relations between activities (program) and space expressed spatiality and social concepts embedded in the settings by teachers who organized them. On the other hand, children's behavior patterns seemed to have characteristics common in different cultures. Similar behaviors found in this study are reported in other cultural contexts. The 'individual' expressed in behavior patterns are perhaps based on a consciousness in a relatively universal level, the individual directly linked with the physical person.

We may say that children in the Danish cases and the Japanese case live in different socio-spatial structures in the *being socialized* level, but have similar needs in the *socializing* level. There are three major aspects that affect children's development. They are age-graded processes of development (universal and natural), cultural environment, and personal differences. The three aspects interact, contributing to the development of the whole person (Minoura, 1990). While space in learning situations is related to cultural concepts of individual/self, children's behavior is related to the development of a culturally universal individual/self. This process may take place in the physical/spatial dimension more than we had known.

4.3 Concluding comments: areas for further research

Recent efforts in re-contextualizing our understanding of space in the environment as a whole implicate many interrelations between research disciplines. Jeffery Lackney (1994), in his extensive review of literature in three disciplines educational psychology, environmental psychology, and environmental design research, says, though the three disciplines investigated key linkages of the school environment, they rarely shared common interests. Architectural research, especially case study approaches, may be able to provide a perspective to link them, since many relations are mediated and experienced in space. For example, according to Lackney the open education/open classroom issue (which has also been taken up here) not only crosses disciplines but also implicates all dimensions concerned.

Inge Mette Kirkeby analyzes space in five categories: *social space; space for activities; behavior-regulating space; space as a carrier of meaning; space of atmosphere* (Gitz-Johansen et al., in press). The findings shown in this report indicate links between the categories. Social space, regulations of behavior, how atmospheres are created are all connected to how space carries meanings. There seems to be complex relations we need to explore further. Here I shall address some areas for further research.

Space in a pedagogic context

Communication and control between teachers and children involve space. For example, we have seen that space was used to communicate a message in the Japanese open school. Though space-use in the Danish cases were interpreted as *functional* from patterns in individual work situations, it is also possible that the intention was to create an atmosphere for children to concentrate on themselves' work by keeping them at their seats.

There were other signs that space was a pedagogic tool in the symbolic level. Teachers in several schools told me that they think "the building tells children how to behave" though the buildings were all different in design. In schools with an open-plan or a relatively open spatial arrangement, children often said "shhh..." to each other if it started to be noisy. The teacher did not have to tell them to be quiet. (I have seen such scenes in Sweden, Japan, and America as well.) The openness of the building required more self-control of children, and children had learned how to behave. It is not the building itself that "tells" children. The rules necessary for daily operations of the buildings do.

How is space used as a pedagogic tool in terms of communication and control? The tendency in Japanese open schools to 'open' the spatial setting as much as possible may be modes of 'minimizing the impression of teacher control' and 'delegating control to children' that are characteristic strategies in Japanese schooling to foster internalization of norms (Lewis, 1989). I noticed that in Danish schools teachers often assigned children to specific places in open settings and children frequently negotiated with the teacher about where to work. Such explicit one-to-one communications do not happen much in Japanese schools.

The aims in providing open settings seemed to be different in Danish and Japanese schools. In Japanese schools, open settings are meant to 'free' children from the traditional classroom setting and the teacher does not control children's work places. In contrast, as mentioned, teachers in Danish schools often controlled where children worked in open settings according to specific needs. They could be practical needs such as table-size or pedagogic needs such as keeping an eye on some children. The aim is to make the learning activity function well and that "children must learn to control themselves" (a teacher's comment). Though children are equally under explicit/implicit control in both contexts, we may say that self-control is

emphasized in Denmark while non-control (by the teacher) is emphasized in Japan. The same type of spatial setting has different meanings.

How do different forms of explicit/implicit rules and verbal/non-verbal communications relate to the use of space? How are pedagogic ideas and concepts, teacher-pupil communications incorporated in the use and experience of space?

Cultural context

Characteristics of Danish and Japanese contexts can be summarized as follows (Table 2), based on the observations and theories (Berque, 1982; Lewis, 1989; Nitschke, 1993; Tsuneyoshi, 1992). I again emphasize that the qualities mentioned on different sides of the table are not exclusive. They exist in both contexts but in a different balance. The role of space in educational settings is embedded in cultural and pedagogical structures. When we say space carries a meaning, we usually think about the symbolic aspect. However, as in the Danish cases, space, by being used in a basically functional manner, expresses its' role in the culture thus communicating the structure of the cultural environment.

Table 2: Comparison of Danish and Japanese contexts

	DENMARK (WEST)	JAPAN
<i>Spatiality</i>	Subject-object separated Form and meaning not directly associated	Subject-object not separated Form and meaning associated
<i>Communication and control</i>	(Relatively) Verbal, explicit, external, direct	(Relatively) Non-verbal, implicit, internal, indirect
<i>Concepts of self</i>	Emphasis on mind	Ecological self relatively emphasized
<i>Present discourse in education</i>		Emphasis on 'individualizing'
	Communication less dependent on non-verbal channels	Communication requires non-verbal channels
	Space viewed as tool	Space viewed as showing social meaning
	Since self is in the mind, it is most important that what children do is differentiated	Since self is ecological, differentiation must also take place in the physical dimension
<i>Space use</i>	Functional / Symbolic	Functional / Symbolic
<i>Open settings</i>	Open setting meant to support diverse activities to function well	Open setting meant to free and individualize children in physical experience

The table can be viewed in a similar way to the socio-ecological model. The categories spatiality, communication, concepts of self, and discourse are in the social level. Space use and open settings are observable phenomena in everyday situations. The texts in between (without labels) describe the process between them.

Analyzing 'scenes' of school life

In the present report I have analyzed functional/symbolic aspects and the behavioral aspect of space, in relation with teachers and children respectively. Though the analyses so far are useful in gaining overviews of structures of the environment and behavior, structures of *scenes* children experience are left to be explored. That is, how the different aspects are integrated in a total experience in actual scenes. During the observations in the four schools and other Danish schools, I noticed that in the most attractive situations the border between functional and symbolic aspects of space was ambiguous.

The contrast between functional and symbolic aspects may have appeared clearly because teaching is first planned in the social dimension and then applied to space in structured learning situations. The model for analysis, describing situations as a system of social and spatial settings, is a representation of this structure. However, there are many situations besides lessons analyzed in this research that are less structured and formal.

One of the objectives of *tema uge* and *fag dag* is that children learn how to organize their work. In a broad sense, it includes finding and arranging work places that fit their practical and behavioral needs. The program crosses and dissolves the line between functional and symbolic aspects. In a project called 'Classroom of the Future', a classroom was created with separate corners each with a small blackboard instead of having all seats face one blackboard in the front. The space symbolically dissolved the traditional teacher-pupil structure and at the same time functioned well for group work. In this research, simplified categories were used in the analysis of learning situations. How can more integrated structures and experiences of them be described better?

Methodologically, as architect Takeshi Suzuki raises the problem, we lack methods for analyzing *scenes* and the experience of place as a total one. We have tended to put more emphasis on the activity 'what people do' in space than on 'how people are' in space which is an important quality of experience. His study on 'mode of being in places' in urban places, based on the concept that many relations are 'generated' around a person who takes a position in space (Suzuki, 1997), may be useful in analyzing school settings. Of course, we must take in account the pedagogic and social structures in the school that do not exist in urban public places.

Behavior, children's perception of space, and development

Would children in Danish and Japanese schools perceive space in different ways? If so, how? We have seen that the frames spaces work in were considerably different in the two contexts. One of the questions arising is, how would the different roles of space in learning situations affect children's perception, behavior, and development in a conscious level? That is, how is children's cultural development related to space?

Another question is, how do the children perceive the socio-spatial structure observed in their behavior? As mentioned before, there is a correlation between older students' recognition of public and private places and their behavior (Minami, 1993). In case of younger children, for example fourth graders who were subjects of this research, would they recognize the structure in a conscious level? If so, how?

There were implicit and explicit rules in the use of space. In the Common room school, there was a rule saying children playing in the common room must give over the space if there are children working. In the Open-plan school children were to play outside during pauses. As in the Village school, teachers' use of space could express to whom the space belongs (see

p.21). Such rules could affect how children perceive the space and thus their behavior in it.

Having identified many issues in the external, observable dimension, the next step shall include internal, psychological processes of interactions between children and the environment. I especially emphasize that the development of cultural patterns in relating with space is an interesting area open for exploration.

In conclusion

In summary, the findings and discussions point towards an area involving *culture, pedagogic practice, development*, and their relations with space and the physical environment to be explored further. I have, for instance, identified issues such as

- Space in a cultural context
- Pedagogic practice, space, and culture
- Development as an interaction between cultural and universal processes

in the area. These are important issues but not exclusive. They are interrelated, overlapped, and nested within each other. Each one inevitably leads to another. The socio-ecological model presented in the introduction was a useful tool for analyses. However, it must be reframed to handle the complex interrelated interactions involved in a broader context. In the first model, I have indicated *elements* involved in the structure. The revised model to start with is built of *categories* and *patterns* of interactions and indicates a field of interactions between them to be explored (Figure 10).

Many research problems involving *culture, pedagogic practice, and development* have been addressed elsewhere and theories have been built in the relevant disciplines. The most significant implication of this research is that those aspects of the school setting have almost direct connections with children's physical and spatial experiences. An understanding of the complex relations around the experience of space shall be a useful tool for architects and teachers in dealing with space to create richer environments for children's learning.

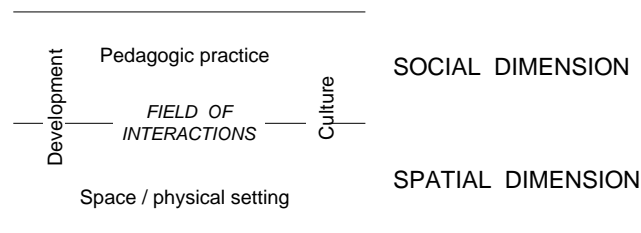


Figure 10: Revised model

REFERENCES

* indicates literature written in Japanese. Titles were translated by myself if not provided in the original publication.

- Altman, Irwin & Martin Chemers (1980). *Culture and Environment*. Monterey CA: Brooks/Cole.
- Berque, Augustin (1982). *Vivre l'espace au japon*. Presses Universitaires de France.
- _____ (1986). *Le sauvage et l'artifice -Les japonais devant la nature*. Gallimard.
- Curtis, Paul & Roger Smith (1974). A Child's Exploration of Space. *School Review*, August, 671-679.
- Dovey, Kim (1999). *Framing Places –Mediating Power in Built Form*. London and New York: Routledge.
- Gitz-Johansen, Thomas, Jan Kampmann & Inge Mette Kirkeby (in press). *Samspillet mellem børn og skolens fysiske ramme*. Statens Byggeforskningsinstitut, Roskilde Universitetscenter.
- Hillier, Bill & Julienne Hanson (1984). *The Social Logic of Space*. Cambridge University Press.
- * Itoh, Shunsuke (1999). *Children's Environmental Behavior in the Social Context of Elementary Schools*. Ph.D. thesis submitted to the University of Tokyo.
- * Kurakazu, Ryoko & Jun Ueno (1999). Actual Conditions of Pupils' Learning and Living Activities in Public Primary Schools. *Journal of Architectural Planning and Environmental Engineering*, Architectural Institute of Japan, 520, 139-144.
- Lackney, Jeffery A. (1994). *Educational Facilities: The Impact and Role of the Physical Environment of the School on Teaching, Learning and educational outcomes*. Center for Architecture and Urban Planning Research, University of Wisconsin-Milwaukee.
- Lewis, Catherine C. (1989) Cooperation and Control in Japanese Nursery Schools. In: Shields, James J, Jr. (Ed.) *Japanese Schooling -Patterns of Socialization, Equality, and Political Control*. University Park and London: The Pennsylvania State University Press, 28-44.
- Minami, Hirofumi & Naoki Yoshida (1993). The Hidden Dimension of Space in School Environment: Implicit Rules in the Use of Space. *MERA Journal* 1, 2, 33-40.
- * Minoura, Yasuko (1990). *Children in Culture*. Tokyo: The University of Tokyo Press.
- Moore, Gary T. (1986). Effects of the Spatial Definition of Behavior Settings on Children's Behavior: A Quasi-experimental Field Study. *Journal of Environmental Psychology*, 6, 3, 205-231.
- * Nakane, Chie (1978). *The Dynamics of a Vertical-structured Society*. Tokyo: Kodansha.
- Neisser, Ulrich (1994). Self-perception and Self-knowledge. *Pyske & Logos*. 15, 392-407.
- Nitschke, Günter (1993a). *Ma – Place, Space, Void*. In: *From Shinto to Ando: Studies in architectural anthropology in Japan*. London: Academy Editions, 48-61.

- _____ (1993b). Beyond fence and focus; beyond sacred and profane. In: *From Shinto to Ando: Studies in architectural anthropology in Japan*. London: Academy Editions, 62-83.
- * Saeki, Yutaka (1995). *The Meaning of Learning*. Tokyo: Iwanami Shoten.
- * Sato, Manabu (1998). Evaluating School Architecture: From a Pedagogic View Point. In: *Symposium proceedings 'Planning Research and Evaluation of School Architecture'*, Architectural Institute of Japan, Annual conference.
- Skantze, Ann (1989). *Hvad Betyder Skolhuset?* Pedagogiska institutionen, Stockholms universitet.
- Suzuki, Takeshi (1997). Mode of Being in Places: A Case Study in Urban Public Place. In: Wapner, S. et al. (Eds.) *Handbook of Japan-United States Environment-Behavior Research: Towards a Transactional Approach*. New York and London: Plenum Press, 113-129.
- * Tsuneyoshi, Ryoko (1992). *The Forming of Behavior Patterns in Japan and the U.S.: The Hidden Curriculum*. Tokyo: Chuoukoronsha.
- Tuan, Yi-fu (1982). *Segmented Worlds and Self: Group Life and Individual Consciousness*. Minneapolis: University of Minnesota Press.
- Vecchi, Vea (1998). What Kind of Space for Living Well in School? In: Ceppi, Giulio & Michele Zini (Eds.) *Children, Spaces, Relations: Metaproject for an Environment for Young Children*. Regio Children Domus Academy Research Center, 128-135.
- Wolfe, Maxine & Harold Proshansky (1974). The Physical Setting as a Factor in Group Function and Process. In: Lang, J., et al. (Eds.) *Designing for Human Behavior: Architectural and Behavioral Sciences*. Stroudsburg, Pennsylvania: Dowden, Hutchinson & Ross, 194-201.
- * Yamazaki, Masakazu (1990). *Japanese Culture and Individualism*. Tokyo: Chuoukoronsha.
- * Yanagisawa, Kaname (1991). A Study on the Territory Making of Children in Open-space of Elementary Schools. *Journal of Architectural Planning and Environmental Engineering*, Architectural Institute of Japan, 424, 31-42.