THEMATIC REVIEW

SCHOOL DESIGN AND LEARNING ENVIRONMENTS IN THE CITY OF MALMÖ, SWEDEN
Disclaimer

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The working paper is printed in this form to communicate the result of an analytical work with the objective of generating further discussions on the issue.

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1. Introduction

This thematic review presents the main findings and recommendations resulting from an assessment of education infrastructure investments in the City of Malmö, Sweden. The city’s recent education investments were co-financed by a €160 million loan provided by the Council of Europe Development Bank (CEB). The review was carried out by the CEB’s Technical Assessment & Monitoring Directorate as part of its regular technical monitoring. In agreement with the city’s education officials, the objectives of the technical monitoring were expanded to include a more in-depth examination of the links between school design and learning environments. More specifically, the review sought (i) to assess how the city’s vision for schools reflected current international trends in school design and (ii) to explore how the selected facilities were performing pedagogically, i.e. the way teachers and students utilise the opportunities provided by the building design to maximise student learning.

The purpose of this review was to provide city officials with recommendations on how to enhance the effectiveness of the education investment carried out. This is the third review of this type completed by the CEB as part of its Series on Innovative Learning Environments. The two previous reviews were carried out in Espoo, Finland in 2018 and in Seine-Saint-Denis, France in 2019. The review was completed during the week of September 14-18, 2020 by a team of experts led by Ms Yael Duthilleul, Education Advisor at the CEB, and comprising Ms Raffaella Carro and Mr Leonardo Tosi (Education Specialists) and Mr Reino Tapaninen (Architect). As a result of the Covid-19 context, which prevented the review team from travelling, interviews with officials, principals and teachers were conducted remotely and a local cameraman, Mr Kristoffer Hamilton, produced a film of each of the schools included in the review.

The report starts with a brief introduction to the City of Malmö and its education context and then presents the conceptual framework and methodology developed to respond to the key objectives of the review. The main findings of the review make up the core of the report, which concludes with a set of recommendations.

1.1 City Socio-economic Context

With 343,650 inhabitants registered in 2019, Malmö is the third largest city in Sweden and the country’s fastest growing metropolis: its population is expected to increase by 50,000 by 2029. The population is relatively young, almost half the population (49%) being under 35 years of age. High birth rates and immigration account for most of the increase. Malmö is one of the most diverse cities in Sweden with 34% of the population having been born abroad (compared to the national average of 19%) and 186 nationalities represented. The largest group nowadays come from Iraq, followed by countries of the former Republic of Yugoslavia, Denmark, Syria, Lebanon, Iran and Afghanistan.

The city has undergone a transition in the last decades from being an industrial city to becoming a service/knowledge oriented one. The Öresund bridge to Copenhagen, the opening of a university in Malmö and, more recently, the opening of the new Concert Hall, are all important contributors to this change. At the same time, Malmö is partly characterised by segregation and social disparity. Thematic maps of Malmö show how income, forms of home tenure, age distribution and school results are distributed in clusters across the city. The housing market functions as a sorting mechanism. Southern and eastern districts tend to have larger concentrations of disadvantaged populations.
While Malmö has always been a migrant recipient city, the capacity of the city to successfully integrate the migrant population has changed: partly because the profile of newcomers is now different, with the arrival of less educated populations, and partly because the transformation from an industrial city to a knowledge city has led to an increase in demand for higher level skills. This shift has contributed to generating a skills mismatch in the labour market and as a result, migrants now tend to experience a longer period before finding a job and fully integrating. Data for the overall country show that one year after the completion of the two-year introduction programme for newly arrived migrants, only 22% of low-educated men and 8% of low-educated women were in employment (OECD, 2016). It is not only the low-educated migrants who face challenges integrating into the labour market, but also the highly educated ones, who face challenges and delays in getting their qualifications recognised. As a result, the unemployment rate in Malmö is 13.6% while the national average is 7% (Swedish Employment Service, October 2019).

The Comprehensive Plan adopted by the City Council on May 22, 2014 aims to break these trends and supports the creation of a socially balanced city with good living conditions for all. The objective is to make of Malmö a socially, environmentally and economically sustainable city and an attractive place to live and work. Investing in education has become one of the main priorities. The loan requested from the CEB is aimed at supporting the investments planned for the sector in the coming years.

1.2 Education Context

Education in Sweden

Education is a public priority in Sweden and public expenditure on education as a percentage of GDP is high (6.8%) compared to OECD and EU averages (5.6% and 4.2% respectively). Its education budget amounted to 13.7% of public expenditure in 2017, just above the OECD average of 12.9% and the EU average of 10.2%. In the 1990s, the responsibility for the provision of primary, secondary and adult education services was transferred to the municipal level and changes were made to encourage the creation of independent schools. Parents and students can now choose which school to attend, depending on the availability of places, and municipalities have to ensure that all students in their catchment area can attend one of the public schools in the municipality. Funding for schools is based on a school voucher system which follows students to the school of their choice. Vouchers differ from one student to another and between different types of schools. School funding is shared between the state and municipalities, with the state providing resources in the form of a general state grant, but overall funding for schools is left to the discretion of each municipality. As a result, funding levels show important variations across municipalities. Preschool education is financed partly in the same way, but, unlike compulsory education, is not fully free of charge. Preschools are allowed to charge fees to cover part of their costs, but the amount of these fees is regulated with a maximum fee determined by the central government. Schools serving the Sami minority and special schools are financed directly by the state.

High expenditure does not always translate into high performance. Over the past decade, student average performance in Sweden has declined from a level above or around OECD average to below the average in all three core subjects (reading, mathematics and science) as measured by the Programme for International Student Assessment (PISA) that assesses the skills and knowledge of 15-year-old students. No other country participating in PISA saw a steeper decline than Sweden over the same period. The disappointment of the 2012 results, when Sweden ranked 28th out of 34 OECD countries in maths and 27th in both reading and science, has sparked a debate on quality and equity
and there is now a broad consensus on the need for change. Performance has declined over the past decade among socio-economically disadvantaged and advantaged students alike. The increase in the share of immigrant students (from 12 to 15% between 2003 and 2012) had only a small impact on overall results and cannot explain the significant decline in Sweden’s overall results. But the performance gap between immigrant and non-immigrant students remains a challenge for the system. Almost one in two immigrant students in Sweden (48%) performs below the baseline level in mathematics compared with 22% of non-immigrant students.

**The compulsory education sector in Malmö**

In Malmö, there are 79 municipal compulsory schools (and 26 smaller units for students with special needs) serving about 32,730 students from Kindergarten to grade 9. The share of students enrolled in private schools, not included in these figures, represents 15% of total enrolments. Since 2015, Malmö has received about 1000 newly arrived immigrant students every year in the compulsory grades.

About half of the students in compulsory education in Malmö have a foreign background and a mother tongue other than Swedish. The segregation that results from the concentration of new arrivals in disadvantaged schools limits the interaction between foreign-born and native-born Swedes. This tends to be associated with slower language acquisition and limited network formation and may negatively impact on long-run integration. The concentration of children from low socio-economic and foreign backgrounds, while largely a result of residential segregation, can be exacerbated by school choice policies (OECD, 2015).

Average student achievement at the end of compulsory education (grade 9) in Malmö is below that of other main urban cities. These disappointing results in the context of the national debate sparked by the decline in PISA scores has led the city in the last few years to introduce a set of measures aimed at improving the system. These include restructuring the provision of education services, from 11 districts to the current 6, and reorganising the Education Department to support educational leadership, to invest in teachers’ careers, and to support the development of a mother tongue language programme and of a joint system for the follow-up of goals and results.

As a result of these initiatives, about 14,500 students now receive mother tongue education in 47 different languages for 60 minutes per week, and 2,500 of them benefit from education support in their mother tongue. Students that have another mother tongue are also entitled to teaching in Swedish as a second language.

By the spring of 2019, the Department of Education concluded that results in all grades continued to show improvements as a result of the efforts engaged, with average student achievement in grade 9 continuing to be higher than in 2015, although slightly lower than in the previous year.

The current segregation of students, the observed increase of about 8,500 in student numbers between 2014 and 2020, and the expectation that in the coming ten years total enrolments will increase by an additional 3,200 students put the system under pressure. In order to respond to this increased demand, attention is now being given to making a thorough examination of the existing facilities to make better use of them, to support the necessary expansions on existing premises, and to ensure that new constructions are designed to make more efficient use of both space and resources. In order to break current segregation, there is an initiative to build new 7-9 grade schools with a special focus/profile and increased capacity in the centre of Malmö. The purpose of establishing these new schools with extra capacity is to attract students from different city areas and different socio-economic backgrounds who would be interested in a special programme content (music, sports, etc.).
1.3 The City Planned Education Investment 2016-2021

The aim of the programme co-financed by the CEB is to rehabilitate and expand existing school buildings and to build new facilities to accommodate the increasing numbers of students. The programme concerns the partial financing of the city’s total investments in education infrastructure for the period 2016-2021, amounting to a total of €420.5 million. The programme’s objectives will be achieved by implementing the city’s investment programme and respecting its strategy to create better educational facilities by complying with aspects of equality and parity. Significant additional investments are already foreseen for the years to come to meet the demand for an additional 3,200 places.

2. Conceptual Framework for Reviewing Innovative Learning Environments

A conceptual framework for examining innovative learning environments was developed by the CEB’s Technical Assessment & Monitoring Directorate and applied for the first time in the review of Espoo municipal education investments in 2018 (Duthilleul, et al, 2018), in Finland, and then in the review of Seine-Saint-Denis Department investments in 2019 (Duthilleul, et al, 2019), in France. Two axes are taken into consideration in the CEB’s conceptual framework: the architectural characteristics of the building itself and the use given to the building by teachers and students to achieve the educational objectives of the school. For the thematic review of Malmö, the focus on these two axes to examine the learning environments remained but were studied through the framework of the 1+4 Manifesto: Learning Spaces for a New Generation of School (Borri, 2016). The 1+4 Manifesto lens had already been applied in the Seine-Saint-Denis review and had proven very effective in capturing the whole school as an organisation. Since it also provides a useful link between school design and the pedagogical use made of the different types of spaces, it was decided also to adopt it for the examination of the architectural features, thus ensuring a better link between the analysis of the two axes.

The framework of the 1+4 Manifesto is based on three main pillars (Borri, 2016; Borri, 2018; Tosi, 2016; Cannella, 2006):

- the influence of the environment on learning based on a strict relationship between pedagogy and architecture (Weyland & Attila, 2015, Montag Stiftung, 2012, Lippman, 2010);
- the reciprocal nature of the interaction between the student and the learning environment (Bronfenbrenner, 1979);
- the whole-school approach in which learning takes place everywhere (Conner, 2004; Sulonen & Sulonen, 2014).

Concerning the first axis, which analyses the architectural characteristics of the building, each school visited was assessed according to three key principles: type of space, connectedness, and flexibility. The types of space distinguish the categories defined in the 1+4 Manifesto (traditional classroom, exploration space, agora, individual and informal spaces). The connectedness refers to the capacity of the school building spaces to be inter-connected internally and externally. It includes the possibility to move easily from one place to another for formal and informal learning. This leads to a conception of the overall school physical space as a whole environment that provides opportunities for learning, as learning can take place everywhere and cannot be confined to the classroom. In a broader sense this
focus of analysis also includes ICT connectivity. Flexibility is the capability of the building to respond to the needs of users as they change over time. This capacity to accommodate change can be examined over the three different time horizons, the long term, the medium term and the short term (Duthilleul et al, 2018). For the purposes of this review, the focus will be on the short and medium terms.

Under the second axis, the use given to the building by teachers and students to achieve the educational objectives of the school, the 1+4 Manifesto focuses on how these functional spaces are used. In particular, it analyses the spaces according to their ability to promote active methodologies that encourage social interaction, collaboration, creativity, creative thinking and innovative use of technology (Borri, 2018) and better respond to the demands on graduates to be equipped with twenty-first century skills. This implies various possibilities such as:

- **Collaborating and working in groups**, with workstations usually arranged in islands, equipped with Internet access and tools for data acquisition and processing, where it is possible to interact, plan, process and analyse data.
- **Designing in a group and creating products** through the aid of creative tools and digital technologies, with instruments for jointly dramatizing, developing, assembling, and editing multimedia content.
- **Performing individual tests**, with workstations isolated in a way that favours concentration of the individual and the carrying out of exams, tests, or other types of checks.
- **Presenting works**, whether individual or group, with tools for collective viewing or for the projection of multimedia content and sessions set up for optimal viewing.
- **Discussing mutual problems**, with a setting that encourages the communicative dimension, moments of interaction and exchange, favouring problem-solving and the evolution of decisions.

The framework was further refined to better capture some of the specific issues faced by the City of Malmö concerning diversity and inclusion. Each school visited was examined through a perspective adapted from Eurydice's conceptual framework for the analysis of policies and measures promoting the integration of students from migrant backgrounds into schools (European Commission/EACEA/Eurydice, 2019), focusing on two different aspects: (i) how the school makes room for diversity through language provision and support and intercultural education, and (ii) how it promotes a whole-child approach including their socio-emotional well-being in order to create an optimal state for learning.

Considering the above-mentioned layers of interpretation, all contexts of learning, classrooms and virtual spaces, are centres of multifaceted and complex activities: “they are places where intensive social, cognitive and cultural mediation occurs as knowledges and subjectivities meet, cross and resist each other” (Kumpulainen & Mikkola, 2014; Rex et al, 2006).

### 2.1 School Design

**Changing the vision: from control to learning needs**

Over the course of the twentieth century, the industrial society promoted a school building whose functional and symbolic aspects have never since been questioned. The spatial organisation of this kind of structure aimed to create hierarchical relationships based on criteria of order, control, surveillance, discipline, and competition (Markus, 1993). From pedagogical and educational points of view, the furnishings of the classroom were geared to a “lecture-based” model which underscored
the fact that the knowledge possessed by the teacher was to be transmitted and acquired by the learner. Most of the school buildings currently in use were designed and built according to this model, the result of which includes a series of classrooms quite indistinct from one another with a few classrooms devoted to special activities (e.g. laboratories), all interconnected by corridors. The educational research on school architecture agrees that these environments, constructed with criteria dictated by that school model, are now no longer sufficient to ensure an effective learning environment with respect to the educational needs of the third millennium.

Nevertheless, it is not simply a matter of upgrading the school building; it is also a process of cultural innovation, with a rethinking of the role of the school and its organisation. A lecture-based methodological model requires nothing more than a “fixed” space with immovable desks and chairs, but a methodological framework that includes a mix of approaches and teaching strategies centred on the learner requires another way of relating to the environment. The characteristics of the environment are no longer rigidly established a priori, but are determined by the type of activity to be carried out. And, since the activities are also diversified, the environment must provide different work areas and equipment. Open spaces, internal areas, flexible furnishing, and mobile technologies are just some examples of a new educational environment that requires a global rethink. In this sense, the generalist classroom loses its hierarchical hegemony and the quasi-monopoly of school time, to make room for a series of diversified environments that can, as far as possible, be modulated according to needs, with a growing focus on the use of external areas for learning, for example by creating external classrooms that may be accessible from internal spaces. Open education principles (Iiyoshi & Kumar, 2008) suggest that schools should adopt an open approach to learning, providing learners with opportunities for developing twenty-first century skills, such as problem-solving, inquiry, collaboration, and communication. The physical learning space should support this perspective and be designed in order to facilitate and inspire innovative teaching and creative learning (Kampylis & Burke, 2007).

From a vision based on static spaces, abstractly defined with a top-down approach that replicates the same structure, there is a tendency now to move towards a dynamic and functional vision of space in which the local community is often involved in the various design phases, or at the very least, in the step of defining the framework of needs.

Over the last decade, international projects have been promoted to go beyond the traditional classroom concept and to define the characteristics of a new learning environment that could better respond to the new education vision and understanding of the learning process. This includes the rethinking of educational spaces and the role of digital technologies and network connectivity. To this, we must add that the prospect of life-long learning which casts the school into a dimension where it is called upon to provide the foundations so that students can learn to learn and continue to do so without interruption their whole life through.

**Types of spaces and their functional use**

These spaces are defined by the 1+4 Learning Manifesto.

The “1” stands for the former classroom, now a modern learning configuration used daily by class groups (the Group space) with their teachers and possibly open (with different possible degrees of openness, from transparency solutions to completely open spaces) to the rest of the school.
The “4” stands for four main types of places related to the life of the school (Exploration space, Informal space, Individual space, and Agora as the Plenary space): each of them represents a specific functional space. The functional spaces are the following:

The **Exploration space** is a place for discovery, designed to promote a hands-on approach using suitable instruments. The **Informal space** is for relaxation, recreation, and leisurely meetings. A modern environment unlocks forms of informal learning that can take place in places furnished with soft chairs, sofas, wet corners. The **Individual space** is dedicated to concentration and individual study, where everyone can withdraw, read, reflect, and learn. All that relates to individual responsibility and independent time management. The **Plenary space (Agora)** is a place designed to accommodate a number of users participating in an event in a prevalent listening mode.

### Connectedness

Through a sense of connectedness people can be participants in education either as observers or active players. This also contributes to making learning visible, valuable and shared. This capacity to connect people easily and quickly can be examined from three focuses:

**Adjacency** - people can feel more connected in the spatial environment when moving easily from one place to another, thus feeling part of that environment. In schools, connectedness can be afforded by visibility across spaces, either because there are no solid walls or because there are glass walls; it can also be afforded by how close the spaces often used are to each other and how easy it is to move from one space to another. It is also important to keep some separation between certain types of spaces, for example, keeping spaces with noisy activities away from those where there may be a need for quietness (Duthilleul et al, 2018).

**Connectivity** - this focus uses the LEEP (OECD, 2017) definition of connectivity that considers the “Connections between people and things in both the physical and virtual realms”. Here, importance is given to analysing how modern technology is embedded and used in the physical space, and how it shapes the built environment and mediates the social practices of learning. In many of today’s classrooms, it is not possible to separate learning spaces and ICTs. The use of ICTs extends and adds new dimensions to learning beyond the school grounds to encompass and connect with homes and communities locally, nationally and internationally.

**Transparency and safety** - schools are designed today with greater elements of transparency throughout the building, which is often achieved by creating open spaces or using glazing between spaces in the form of fully or partially glazed walls. The arguments for this are that it creates a sense of connectedness whereby people can be participants in education whether as observers or active players. It also contributes to making learning visible, valuable and shared. People can feel more connected in the spatial environment when they can see what is happening around them, move easily from one place to another, and feel part of that environment. The transparency can also be used for surveillance and control purposes: glass windows can be used to monitor the spaces and the use of the facilities. This contributes to strengthening the feeling of safety in everyday school life.
**Flexibility**

The flexibility of school buildings has also become part of the picture, with the recognition that a building should be able to respond to the needs of users as they change over time. This capacity to accommodate change can be examined over three different time horizons, the long term, the medium term and the short term, in the following way:

*Adaptability*, where the building is responsive to change over the long term. For example, it can be made larger to accommodate more students. This involves substantial changes to the fabric and possibly even the structure of the building. To evaluate the adaptability of the building would demand analysis of the structural design, which is beyond the scope of this review.

*Adjustability*, where parts of the building can be reconfigured over the short- to medium-term by manipulating elements to create different spatial arrangements. For example, to make a space larger, smaller, or have a different shape.

*Agility*, which refers to short-term flexibility where the settings, furniture and IT equipment can be rearranged quickly and easily. This relates to changing the use of the space and is the kind of change that individual users might be able to make themselves. An agile learning space is one that can respond to the needs of students and teachers quickly and, in particular, one where the furniture and technology such as projectors and display screens can be easily rearranged. This short-term flexibility of the school building can be complemented by an assessment of the “flexibility in use”, which is the extent to which users can use the spaces because they have a choice of whether to rearrange the settings, and can do so easily and quickly, or whether to use other appropriate spaces nearby (Duthilleul, et al, 2018).

**Inclusion and accessibility**

Inclusion encompasses the idea of a school for all. In an accessible environment, all students have equal opportunities to study and participate in all the activities of the school. The principle of ‘Design for All’ is based on design solutions that respect the diverse needs and capabilities of all the users. Accessibility means safety and quality. It is about thinking, having the right attitudes and respecting diversity. A barrier-free environment does not distinguish people by their ability to function - accessibility is simply about accepting human diversity.

The design is based on solutions that are suitable for everyone, the flexibility of the premises and the fact that the built environment allows its users to move and operate on an equal footing. Accessibility of the environment refers to the effective design and also the resolution of level differences for persons with mobility aids. The sensory environment is an entity in which the requirements of the visual environment and the hearing environment are solved. Accessibility requires sufficiently strong, even and glare-free lighting, as well as contrasts of darkness and materials, to help visualise the space. Clear signage and material and contrast markings on level differences are important. Accessibility of the hearing environment refers to the effective acoustics and sound reproduction of the premises and to hearing aids such as sound transmission systems. Ease of comprehension requires easy-to-understand spaces and clear and unambiguous solutions, such as the use of symbols in signage.
2.2 Use of Learning Environments

When using an educational space, it is important to consider the educational objectives and students’ individual learning needs. These determine the choice in terms of types of teaching / learning activities, the number of students to be involved (small or large group or individual activity) and the process to be activated (collaboration, communication, individual expression, investigation or individual reflection, skills practice). It is not always easy to combine all these elements, especially in school contexts that have not been designed for flexible teaching or tailored to students’ learning needs.

Teachers’ environmental competencies

The impact of the environment on students’ learning processes is linked to the capability of the teachers to exploit the potential of the learning space. Often traditional lecturing-based teaching methods persist regardless of changes in spatial configuration and furnishings because teachers lack the environmental competence to effectively use the available physical school space (Sanoff 2001; Lackney, 2008). Teachers often perceive space configuration as a default unchangeable element of their everyday teaching practice rather than actively changing it to support and promote learning activities (Wolfe 1986). Environmental competence\(^1\) can be analysed on three levels (Steele 1980; Lackney, 2008): awareness of the impact of the physical setting on teaching practices and student learning behaviours, knowledge of relationships between environment and behaviour, and skill at manipulating the space configuration and in making spatial adjustments that best support the planned activities. This third level competence introduces the concept of flexibility not only as a school design characteristic but also as a pedagogical potential. In this sense “the school becomes an instrument that teachers can manipulate, in order to provide the day to day changes that education demands” (Medd, 1970). “Environmental awareness is the ability we have to analyse our spaces critically and to function intelligently within these spaces. [...] Making sense of an environment is a process of perception, involving the way we organise what we are aware of in a situation” (Martin, 2009).

Awareness relates to the capacity to identify problems that affect a learning environment, but does not necessarily imply the capacity to transform and improve the space setting. Different degrees of space adaptations can be identified when considering the manipulative level of environmental competence (Blackmore et al, 2011; Wood, 2016; CABE, 2007): tailoring the lesson space (adaptations that the teacher can make during the flow of the lesson), adapting the lesson space (planned contextual adaptation before a lesson), organising the space for multiple lessons (planned organisation of the learning space before starting a longer learning module or a project), designing the configuration of the learning space (planning of the learning space at the beginning of a school year). If teachers do not have an active attitude towards space settings and developing manipulative skills, they tend to put in place defensive behaviours that tend to maintain a traditional learning environment (David, 1975).

The availability of differentiated learning zones, flexible furnishing or ICT equipment can have very limited impact on learning processes if the pedagogical potential of those opportunities is not exploited by the teachers. Active learning can be promoted when the teacher is able to exploit flexibility - as a technical characteristic of the space configuration - into a pedagogical means. School design and good teaching alone do not guarantee the full exploitation of the learning environment’s potential: teacher attitudes towards innovation and student-centric pedagogies need to be supported by solid environmental competencies.

\(^{1}\) Environmental competence is defined by Steele (1980) as the awareness of one’s physical environment and its impact on one’s activities, as well as the ability to use or change that environment to suit one’s goals and activities.
The “1+4” formula reflects on the capacity of spaces, in terms of spatial organisation, furnishing and technology to foster student-centric pedagogies. The framework identified “fourteen didactic situations” (Nair, 2014) that represent a variety of learning activities that a well-designed building should support. The “fourteen didactic situations” are embedded in the School Director Survey that was completed by the directors of the schools visited and will be the subject of analysis.

Nair and Fielding (2005; 2014) adopt Gardner’s theory of multiple intelligences (1983) and point out that students learn at their own pace in different ways, in different places, and from different contexts. Adopting a mix of different learning strategies addressed in a learning environment significantly improves learning outcomes (Baumgartner et al., 2003; Ku & Sullivan, 2002). Consequently, differentiated learning zones are important for teachers to promote the appropriate mix of learning strategies (Barrett et al., 2017). Differentiation of learning zones can be pursued through the rearrangement of flexible solutions or thanks to the design of appropriate functional settings.

Use of technology in school

The review analyses the relationship between two major dimensions of Interactive Communication Technologies (ICTs): access and use, and learning environment. Access to ICTs encompasses the availability, accessibility and quality of ICT resources (axe 1); use of ICTs (axe 2) covers the intensity as well as the types and modalities of the ICTs used by students either in an informal and possibly unsupervised environment for learning and leisure, or in a supervised situation in the classroom, notably through the teachers’ pedagogical practices. The uses of ICTs are observed through the “Substitution, Augmentation, Modification, and Redefinition” (SAMR) model that identifies four steps of technology integration. ICTs and learning environment focus on how the different learning spaces promote a different use of ICTs, and on how the availability, accessibility and quality of ICT resources partly shape teachers’ and students’ practices with ICTs, both inside and outside of the classroom.

Use of the learning environment to meet diversity in school

The 2018 Council of European Union Recommendation (2018/C 195/01) on promoting common values and inclusive education stresses the importance of ensuring effective and equal access to quality inclusive education.

In effect, students that are well integrated into the education system have more chances of reaching their potential. Students from migrant backgrounds, however, face a number of challenges that can affect their learning and development. According to the Eurydice 2019 Report on the integration of students of migrant backgrounds (European Commission/EACEA/Eurydice, 2019), one of the main challenges consists in considering not only students’ academic backgrounds, but also their non-academic backgrounds (i.e. social, emotional aspects).

The review team adopted Eurydice’s 2019 international framework for integrating students from migrant backgrounds into schools which considers two main areas of analysis: (i) making room for diversity and (ii) taking a whole-child approach.

Making room for diversity focuses on regulations/recommendations in three areas: the teaching of the language of instruction, home language teaching and intercultural education. Intercultural education may be regarded as an education principle framing teaching and learning practices in schools. It promotes the creation of a common space in which all students – whatever their linguistic and cultural
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backgrounds – can enter into dialogue, recognise their similarities beyond their differences, show respect for one another, and become ready to change their representations of themselves and others.

Promoting a whole-child approach also focuses on regulations/recommendations in three areas: addressing the holistic needs of migrant students, supporting teachers in taking a whole-child approach, and implementing a whole-school approach to the holistic needs of migrant students. Taking a whole-child approach in schools can improve students’ educational outcomes by creating a balance between the attention given to their academic development and that given to their social and emotional well-being.

The 1+4 Manifesto adopted the Eurydice framework to analyse the use of the space and learning environment to meet diversity in school, focusing on the capability of the building to make room for linguistic and cultural diversity and support a whole-child approach.

3. Methodology and Data Gathering

Prior to the visit, the team undertook a review of existing policy documents, studies and statistics on the City of Malmö, selected the type of schools to visit, designed specific survey instruments to collect background information and organised a series of meetings with city officials. All data collection efforts were organised thanks to the support of the city’s Department of Compulsory Education. Information on the instruments designed for data collection purposes can be found in Annex 1.

Five schools were included in the review. One of them was completed in 2017, two in 2018 and the two others in 2019. The selection of schools covered different city areas and grade organisations as reflected in the table below, which summarises key data on each school.

Table 1: Schools visited

<table>
<thead>
<tr>
<th>School</th>
<th>Location</th>
<th>Rörsjö-skolan</th>
<th>Fågelbacks-skolan</th>
<th>Tingdamms-skolan</th>
<th>Hyllievångs-skolan</th>
<th>Toftanäs-skolan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>North</td>
<td>Inner City</td>
<td>South</td>
<td>West</td>
<td>East</td>
<td></td>
</tr>
<tr>
<td>Grades</td>
<td>F-6</td>
<td>7-9</td>
<td>F-6</td>
<td>F-6</td>
<td>F-9</td>
<td></td>
</tr>
<tr>
<td>Students enrolled (2019-2020)</td>
<td>535</td>
<td>564</td>
<td>485</td>
<td>260</td>
<td>393</td>
<td></td>
</tr>
<tr>
<td>Foreign-born (Nyanlända) (%) *</td>
<td>9.2</td>
<td>2.2</td>
<td>0.6</td>
<td>2.3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Foreign background (%) **</td>
<td>66</td>
<td>39</td>
<td>35</td>
<td>56</td>
<td>44</td>
<td></td>
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<tr>
<td>Capacity</td>
<td>625</td>
<td>630</td>
<td>630</td>
<td>630</td>
<td>650</td>
<td></td>
</tr>
<tr>
<td>Total land area (m²)</td>
<td>16 344</td>
<td>14 840***</td>
<td>21 857</td>
<td>19 484***</td>
<td>13 000</td>
<td></td>
</tr>
<tr>
<td>Total net area (m²) ****</td>
<td>2 569</td>
<td>8 140</td>
<td>7 045</td>
<td>8 396</td>
<td>9 011</td>
<td></td>
</tr>
<tr>
<td>Costs (in million €)</td>
<td>5.9</td>
<td>22.3</td>
<td>15.7</td>
<td>21.7</td>
<td>22.9</td>
<td></td>
</tr>
<tr>
<td>Completion date</td>
<td>05/19</td>
<td>05/18</td>
<td>05/18</td>
<td>05/17</td>
<td>10/19</td>
<td></td>
</tr>
</tbody>
</table>

* Percentage of foreign students above 7 years of age who started school in the last four years
** The definition accounts for students who are born outside Sweden or born in Sweden with both parents born outside Sweden
*** Land area shared with other schools
**** Total programmed net spaces as described in the design brief (corridors/circulation spaces and technical spaces e.g. heating, ventilation and air conditioning and electrical rooms excluded)
The City of Malmö Department of Compulsory Education provided the school plans and completed the respective School Background Data Sheets and the School Background Questionnaires.

The review team interviewed school principals, teachers and students from the selected schools and officials from the Education and Technical Departments. All participants provided extensive information on the current status of education in the city and the challenges ahead.

4. Findings

4.1 School Design

The planning and design process

School construction investments in the City of Malmö are based on a long-term planning perspective that matches identified needs with the necessary financial resources. The needs analysis, which is updated regularly, is based on several parameters such as the schools’ assignments, volumes and working methods and the structures and locations of the existing school buildings; it naturally also includes a population forecast, which is the most important tool in planning for the creation of new schools and school locations. The city is committed to ensuring that the equality and quality of school construction is of a high level, thus guaranteeing “the best school for each student”.

The Compulsory Education Department has written a detailed space programme and general guidelines for the design of comprehensive schools. This space programme complies with legislation and regulations concerning the construction of school spaces and follows the school planning recommendations and guidelines prevailing in Sweden (Rönnlund, Bergström & Tieva, 2020). The space programme describes in an overall way which functions and spaces the compulsory school activities need and how they are to be designed. The purpose is to contribute to creating good, attractive and appropriate learning and work environments for all students and staff, bearing in mind the pedagogical perspective and governing documents, such as the curriculum. In addition, research and proven experience are essential to enabling physical learning environments that provide good conditions for learning, security, and health.

The space programme also serves as a basis and support for the production of programme documents (design briefs, designs and plans, tender documents). The space programme is thus always accompanied by orders for changes to premises of a larger nature, such as new school buildings, alterations, and extensions.

Before deciding on the construction of a new school, the capacity of the existing facilities is carefully examined to assess whether it is possible to change the use of the existing premises, whether premises rented possibly to outsiders can be taken back for school use, or whether only a little additional space or a temporary pavilion will be built.

The task of designing the schools is put out to tender periodically every few years, resulting in a pool of about five different architectural and engineering firms from which the designers of each project are selected. The competition is based on price, quality, references, and the resources of the firm.
The space programme and the guidelines provide a good basis for school planning. The criteria for dimensioning premises for schools of different sizes are clear and detailed. Illustrative model plans have been drawn up for the teaching facilities for the various subjects, which facilitates planning and ensures the homogeneity and equality of schools.

Model plan for a home learning cluster for grades F-9

Some values and beliefs embedded in the proposed guidelines reflect a number of contradictions. For example, the guidelines aim at flexibility and versatility in the use of spaces and at the same time they state that classrooms and learning spaces should be enclosed within four walls and classrooms should be similar in all schools and within the school. Window walls and windows facing corridors where many people pass should be avoided, which could be seen as the opposite of the goal of making learning visible. These contradictions contribute to giving a confusing message to school staff on how the physical space is supposed to contribute to the learning process.

The architectural and interior design vision of both the department and the architect of the project appears to dominate the pedagogical choice of furnishings for the facilities, which can be perceived by the teachers and other users of the school as having come from outside.

The school planning process does not foresee any systematic consultation of future users. It is guided by the belief that school principals and teachers change, but school buildings remain. The planning process follows the agreed guidelines, based on a 2013 consultation of stakeholders, and ensures respect for minimum standards across schools in the city. There is no provision for accommodating the design of the learning environment to the school principal’s education vision.
The school buildings

The general infrastructure of schools and the quality level of information technology are well defined in the guiding documents and school design models. This ensures a uniform level of quality and equality between schools. The special needs of students are well integrated in the planning and design on the basis of legislation and building regulations. The school buildings are barrier-free and the needs of the sensory impaired are well taken into account.

The design of the facilities, structures and infrastructure of school buildings has been aimed at easy serviceability and maintenance. The design model requires that the materials used are durable and easy to care for. The quality requirements for infrastructure such as ventilation, lighting, and room acoustics are of a high level. The design guidelines require efficient use of the space provided, and the premises must be available for rent for other purposes if necessary. Attention has also been paid to the safety, security, and controllability of the premises, such as entrance arrangements.

Types of space in the schools visited

Group space

As indicated in the Malmö guidelines, all the schools visited include, next to the traditional classroom (klassrum or basrum), an additional space of smaller dimension called grupprum, connected by a door to the main room. This organisation of the space, called Plus classroom in the Learning Manifesto, promotes group activities and a more flexible social organisation of the learning activities. The layout of the grupprum is usually arranged to facilitate cooperative work or self-study with, in some cases, soft areas or corners that encourage concentration.

In three of the five schools visited, the F-6 classrooms are grouped around a common space to form a learning cluster. This common space is either a place for relaxation during school breaks, or a common learning environment used by teachers and students for “interclass” activities. The cluster includes a working room for teachers and an environment for after school time. Open educational landscapes were not present in the schools visited: as prescribed by the Malmö guidelines, differentiated smaller working group spaces are preferred to open learning spaces.
Exploration space
All the schools visited have very well-equipped modern workshop areas and labs that are linked to the subjects included in the national curriculum, as provided for in the Malmö guidelines. These include: physics and technology labs, chemistry and biology labs, textile and crafts workshop areas, woodwork and metalwork workshop areas, music classrooms, home economics workshop areas. No specific exploratory room is foreseen for transdisciplinary project-based activities (i.e. Makerspaces).
Informal space

Most of the schools visited have different levels of available informal space. Carpets, small sofas or fat boys are located in the corner of a classroom or available in the plus extension (grupprum). Informal islands are sometimes available in the corridors or common areas with seats and small tables. More often, soft comfort zones are available in the shared areas of the clusters (i.e. studietorg) or in the after-school rooms (fritids). Almost all schools have a well-equipped comfortable library, surrounded by workstations, chat rooms and study corners. Some schools include a cafeteria space where students can relax and have a snack in break times. In all schools, these informal spaces are used during free time and they are highly appreciated by students, even if in some cases a reflection on the care of the common good has been necessary. In at least three schools, common spaces are used for teaching.
Individual space

In almost all schools visited there are corners for students to concentrate or read a book or workstations for individual tasks as well as small, protected areas for private chats. Sometimes, the corner or dedicated seat is included in the classroom. The schools offer environments of various sizes and with different characteristics and the whole school building offers many spaces that can potentially be used for individual learning activities or for the students to concentrate at a self-regulated pace.
Individual space (Fågelbacksskolan)

Individual space (Tingdammskolan)
The schools visited do not have a plenary environment dedicated to whole-school events that can bring the school community together. Sometimes, the central spiral staircase is the heart of the school with some seats for momentary stays, but this is not sufficient to host large groups of people. In one school a smaller agora is the core of the school environment, but it is used for seminars and events for a limited number of participants. Normally, the canteen or the dining area is used when a wider audience needs to be involved, thanks to the use of moveable furniture. The wide well-equipped outdoor space is considered as an extension of the school and is sometimes used for plenary events. A large multipurpose space combining dining and performance spaces, for example, is not included in the standard school design model.
**Connectedness**

The schools visited all show that value is placed on working together, learning and being together, and sharing the results of work. The schools’ activities are usually clearly grouped and different activities are easy to find and distinguishable. It is easy to achieve a sense of togetherness, it is easy to navigate and find your own place in the schools. Organising teaching facilities for different age groups in their own home areas helps to create a sense of self-identity, especially at lower grade levels.

**Adjacency**

The layouts of schools visited are clear, and the different types of space groups clearly distinguishable; the separation of spaces with noisy activities from those requiring silence has been clearly implemented. Spaces hosting activities of the same type are grouped closely together, such as the teaching of handicrafts and the visual arts, as well as facilities for science teaching. Moving from different activities to another is easy and hassle-free. Lobby spaces connected to classrooms can most often be utilised for individual learning and free-form group work, depending on the furniture provided.
Connectivity
The City of Malmö’s long-term strategy regarding ICTs is part of the investment programme and guarantees equal access to resources for all schools and IT support mechanisms to ensure their proper use. All schools have wireless internet access (Wi-Fi), so working with a laptop is possible almost everywhere. As a rule, students have access to Chromebooks or iPads provided by the school. Classroom equipment varies, some classrooms have interactive fixed screens or smartboards but, mostly, Internet content can be displayed on fixed whiteboards using a projector. There are few movable interactive smartboards.
Transparency and safety
The design guidelines state quite distinctly that transparency and glass walls must be avoided because of the visual disturbance they may cause when students’ attention is drawn to passers-by in the hallway. Nevertheless, there are some glass windows next to classroom doors and in the walls of more public spaces such as canteens. Glass walls have been used to some extent and many classroom doors have a window, although it can be small and only intended for monitoring the activity or the occupancy of the classroom. Transparency can facilitate a sense of security on the premises and the monitoring of activities in the classrooms. The use of glass walls and glazed doors could help the users to see the activities of the school, facilitate orientation and help to create a strong sense of community and increase the feeling of safety. Otherwise, safety thinking has gone a long way, for example, slips and falls have been prevented by material choices as well as careful structural details such as stair railings and contrasting colours.

Flexibility
The classrooms are normally within four walls, as instructed in the design guidelines, and there is little connectivity with the adjacent classroom - there are hardly any or very few opening partitions or openable walls between the classrooms. However, as presented above, next to most classrooms, there is a smaller group room to which students can retreat to do group work or work in pairs.

The furniture of the schools is light and can be moved and arranged easily in various formations for different types of teaching situations and piled up for cleaning, even though there are usually no wheels on the chairs or desks. The whiteboards and display screens are usually fixed to the wall, which can force the teacher to just one-way teaching.
Inclusion and accessibility

The city’s design guidelines require that schools be versatile activity centres for everyone, and this goal is well implemented and achieved in all the schools. The school buildings are barrier-free and the needs of the sensory impaired are well taken into account. The spaces are easily perceivable, e.g. through the use of materials, contrasted colours and signage. The schools usually have several entrances from the street side and the schoolyard and, when entering, it is easy to visualise the school’s activities and orientate within the school. The lobbies and the corridors are spacious and there is usually at least one elevator for users with reduced mobility. In general, within floors there are no level differences thus allowing for easy use of wheelchairs or other mobility aids, and when there is a level difference there is always a nearby ramp. The quality of acoustics and lighting is of a good level. The acoustics create a good sound environment, and the glare-free lighting meets the requirements of the activities in each space. It is already common in schools to have adjustable lighting that makes it possible to adapt the amount of artificial light available to the specific requirements of a given situation. Future school projects could explore the possibility of introducing the use of dynamic lighting in some learning spaces. Dynamic lighting mimics the natural rhythm of night and day, thus enhancing the well-being of users and contributing to their feeling alert and refreshed. It can therefore be used in schools to tailor the learning environment to encouraging children to stay focused and work effectively.
To conclude this section on school design, based on the school planning guidelines, the City of Malmö seems to produce good and uniform learning environments in which the technical characteristics of the premises are balanced. The facilities are functional, the structures and materials are durable, and the infrastructure is of high quality. The dimensioning of the spaces in relation to the needs in terms of functions and activities seems also to be right and appropriate. The life cycle of the buildings is long, and the long-term adaptability of the premises to changing needs is well taken into account.

4.2 Use of the Learning Environments

The pedagogical use of the learning environments

The buildings of the school visited offer a rich and diverse environment from a functional point of view, in line with the city Education Department’s detailed programme and guidelines. The review team analysed the pedagogical use of the environments by applying the Manifesto framework and gathering the relevant information through the schools’ remote walkthroughs and films, school surveys, and interviews with the principals and the teachers’ focus groups.

The teaching takes place mainly in the group space, characterised by the presence of a space extension (an additional 15m² room). This classroom plus (classroom, plus small room extension) organisation potentially offers the opportunity to engage students in different activities during school time. The focus group discussions confirmed that a number of teachers split the students into smaller groups on a regular basis and assign them different tasks, using both the wider group space and the smaller one to promote group collaboration, independent study and online research.
However, differentiated teaching methods require an agile learning space, in particular, one where furniture can be easily rearranged. In three out of the five schools visited, the classroom furniture is quite rigid, and no particular adjustments are made in preparation for a learning activity. In one school, teachers tried to develop collaborative learning on a permanent basis, but the attempt failed because the school could not adapt the physical learning setting to the new teaching and learning needs. The absence of flexible furniture seems to place a limit on the possibility of experimenting with methodologies that are more active. A good practice was observed in the case of a principal who had the opportunity to influence the choice of some of the furniture. This allowed the school to customise the classroom spaces by providing flexible solutions and, at the same time, provide some pilot classrooms with innovative furniture where teachers could experiment with and test different learning settings and explore the potential of alternative solutions during daily activities.

In the lower grades, classrooms are organised in learning clusters with a central common area and a range of classrooms, teachers’ rooms and after-school activity spaces. Some of the teachers use these spaces applying an integrated approach based on open-class activities in the central common area, addressed to mixed groups with pupils belonging to different classes of the same age. The use of common spaces for open-class activities represents a virtuous use of the cluster organisation of space as it constructively manages the heterogeneity of a school class in terms of cognitive conditions and learning methods, social background, motivation to succeed, state of physical development.

As far as the 7-9 grades are concerned, there is a different approach in the use of common areas and connection spaces. Generally, these spaces are available for the students only during breaks or spare time as informal spaces. In one school visited, soft areas and comfortable corners have been reduced (when not totally removed) to avoid the risk of vandalism. In another school, on the other hand, the informal spaces are comfortably equipped, and teachers said they made efforts to educate the students to develop a positive attitude towards the school’s environments and equipment. In this school no episodes of vandalism or bad use of existing furniture have been reported. This confirms that the rethinking of spaces in a student-centred learning perspective requires deep reflection on the concept of responsibility and movement, with movement conceived as the freedom of students to freely appropriate spaces and as a differentiated and dynamic use of all the spaces in the school for educational purposes (Duthilleul et al., 2019).

According to the Malmö guidelines, schools have modern spaces designed to promote a hands-on approach using appropriate tools. However, the more experiential activities remain limited to traditional laboratories and workshop areas and little space is given to experimenting innovative activities based on ICT-enhanced projects. Some schools have tried some small degree of experimentation using the existing spaces (i.e. a corner of the library) to develop some initiatives or pilot activities that are not directly linked to the curriculum (e.g. 3D design and printing, green screen technology and Lego Mindstorms based activities). These projects are noteworthy because they meet the school’s need also to act as a research centre that experiments with new methods and technologies for teaching.

Furthermore, neither the Malmö guidelines nor the experience of the teachers seems to promote the perception of the overall school physical space as a whole environment that provides opportunities for learning. The 1+4 Manifesto is based on this very assumption, that promoting student-centred learning requires overcoming the idea of a school as a set of closed rooms (classrooms for daily teaching, laboratories for “experiments”, computer room, etc.) connected by corridors reserved only for passage, as learning can take place everywhere in the school.
Teachers' environmental competencies

The review team considers environmental competencies as teachers' awareness of the impact of physical spaces on the students’ learning process and wellbeing, as well as the ability to use the environment or change it to suit learning activities and educational goals (Lackney, 2008; Martin, 2009; Steele, 1980). These competencies are considered as a fundamental aspect of the teachers’ expertise for the school to make an effective use of the potential offered. Considering the schools visited, these kinds of competencies are not part of formal initial teacher education programmes or of any other formal in-service professional development initiatives. On the other hand, annual education commitment plans do not appear to clearly guide school principals and teachers in the use of the learning environments to achieve the expected education objectives. The capacity to exploit the potential of the learning environment is generally left to the spontaneous initiative of the schools or of single groups of teachers.

The school principals have the autonomy to pedagogically lead the school and hire the teachers that align with their education vision. At the same time, teachers can apply to the school that best suits their pedagogical attitude and didactical approach when the school has a defined and visible identity. In this context, schools can develop their vision by involving teachers with an innovative attitude towards learning spaces through the above described selection process.

In some cases, a small group of skilled teachers involve other colleagues from the same school in internal development initiatives, sharing their experience and practice and promoting reflection and discussion with the support of the principal. The heterogeneity of pedagogical approaches that emerges in the schools visited offers a good laboratory for testing innovations and developing best practices to be shared, but sometimes that opportunity is constrained by the limited availability of spaces dedicated to experimentation and trials.

Minimal space is left for piloting and testing new tools, equipment or furniture. If teachers need to improve their environmental competencies, the lack of spaces available for training “on the job”, experimenting and testing can limit the exploitation of the potential of the given learning spaces.

Awareness of the physical environment's characteristics and its impact on students' activities is generally well developed among the teachers in the schools visited, but the ability to focus on a specific problem concerning the physical setting and to define solutions or proposals for improvement is unequal amongst the different schools.

In a few schools, teachers showed particular ability in manipulating the space configuration in order to make spatial adjustments (i.e. arranging some soft corners using carpets or creating isolated corners for concentration within the classroom using flexible furniture) and support a mix of different teaching strategies. In one school, flexible furnishing and advanced environmental competencies enable the teachers to rearrange the classroom setting on the fly during the flow of the lesson to support different teaching strategies.

All schools reserve some time during the year to reflect on the solutions adopted for organising the school space, but only some of them explicitly involve all teachers at the beginning of the school year in the planning and re-configuration of the learning environments. Teachers in all the schools visited regularly customise the space (mainly the walls) to visualise students’ work or to display knowledge resources linked to the curriculum and to the daily lessons. Learning environments are not personalised.
with relation to any particular subject matter, often because more than one teacher uses the same environment for different curricular purposes.

**Technology use in schools**

The impact of ICTs and connectivity in education is based on the capacity of the school to have a clear vision and strategy deployed in their approach to ICTs, to provide access to ICT-based resources (infrastructure, hardware and software, connectivity) and to effectively integrate them in pedagogical practice and for communication purposes (UNESCO, 2018; OECD, 2017; Luckin et al, 2012; Durando et al, 2007; Puishedura, 2013; Kozma, 2003).

Results from the survey confirm that schools have been provided with quality technological infrastructure. The downside of this infrastructure standardisation is that there is a lack of variety in terms of devices and opportunities for schools to experiment new ICT-based pedagogies or contents. Only two out of five schools declare to have additional IT equipment to better respond to the pedagogical goals of the teachers.

On the one hand, there is conspicuous use of technological equipment: students can take their personal devices home and use online communication and learning platforms on a regular basis. Administrative use of IT equipment and infrastructure is widespread, and technology supports communication among school stakeholders (i.e. pupils, teachers and parents). However, a careful analysis of the responses to the interviews shows that innovative pedagogical use of ICTs in classrooms is fragmented and occasional. The technology is mainly used as an enhancement tool (Substitution and Augmentation steps in the SAMR model). This means that students use technology mainly to perform the same tasks that were previously done with pen and paper with no functional change, or with some functional improvement (viewing video or listening to audio). There is little evidence of high-end uses of technology (Modification and Redefinition steps in the SAMR model) such as programming, creative output production (graphic arts projects and 3D objects) or widespread use of digital and interactive multimedia high-quality learning content linked to the national curriculum. None of the five schools declared to use technology for Internet-based collaboration with other schools in the context of national or international projects (see Figure 1 below).

While online platforms to support teacher-pupil communication seem to be widespread and in daily use, there is room for further development concerning the promotion of IT-enhanced authentic learning experiences or for personalising the learning pathway so as to address students’ learning styles, strengths and weaknesses.

Effective use of teaching and learning technologies seems to be a goal for the respondents; some schools have an ICT head teacher to support the use of technology for pedagogical purposes and teachers are aware that their competencies for integrating ICTs into pedagogical practice could be further improved. One of the consequences of Covid-19 has been to make this need more evident.

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2 The SAMR model is made up of four steps – Substitution, Augmentation, Modification, and Redefinition. Substitution and Augmentation are “Enhancement” steps, while Modification and Redefinition are “Transformation” steps. Substitution, Tech acts as a direct tool substitute, with no functional change, Augmentation Tech acts as a direct tool substitute, with functional improvement. Modification Tech allows for significant task redesign, Redefinition Tech allows for the creation of new tasks, previously inconceivable.
School design and learning environments in the City of Malmö, Sweden

December 2020

Figure 1: Reported use of available technology

Use of the learning environment to value diversity in schools

Integration of migrant students and the inclusive development of the school is a process aimed at offering quality education for all while respecting diversity and the different characteristics and learning expectations of the students, thus eliminating all forms of discrimination. Taking the process a step further means ensuring a welcoming environment that guarantees a safe space where all students feel secure, valued and able to learn (Eurydice, 2019; OECD, 2019; EADSNE, 2009; CEC, 2007).

The education authorities promote inclusion according to national policies and Malmö’s long history of integrating different nationalities and cultures. Collaborating with different city and community institutions to address local issues is common practice and a large network of specific profiles and professionals supports students’ integration by providing assistance for their psychological or social needs (access to medical, psychological and psycho-social services and presence of specialised staff such as school counsellors, psychologists, social workers, etc.). This inclusive approach emphasises both mother tongue teaching for children with a mother tongue other than Swedish and after-school activities to support their integration.

Schools interpret diversity as a resource rather than a problem. All teachers are engaged in the education of newly arrived students and many have good competencies in multilingualism, Swedish as a second language, and communication across linguistic differences. The measures for the integration of students from foreign backgrounds seem mostly to involve the provision of language teaching (language of instruction and home languages), while Intercultural education does not appear to be systematically used as a means to make room for cultural diversity. Intercultural education is considered more as a general principle underpinning the whole curriculum: an approach that refers to all students’ growing in a multicultural society.

Academic research has shown that an integrated holistic approach that takes into consideration students’ linguistic and cultural realities has positive effects on students’ well-being and performance in school and minimises the risk of early school leaving. According to the Eurydice Report, “Intercultural education may be regarded as an education principle framing teaching and learning practices in schools. It promotes the creation of a common space in which all students – whatever their linguistic and cultural backgrounds – can enter into dialogue, recognise their similarities beyond their differences, show respect for one another, and become ready to change their representations of themselves and others” (Eurydice, 2019).
Beyond the formal curriculum, extra-curricular activities have a role to play in promoting intercultural education in schools. Some experiences emerge from the interviews in which schools promote an inclusive whole-child approach through the involvement of students and families in multicultural events open to the school community. However, such good practices have not emerged in a systematic way and could be further widespread by promoting networks with other schools or organisations, special days, events or projects. It is possible that the current restrictions on gatherings imposed by Covid-19 is impacting on this.

A welcoming and trusting learning environment is part of a whole-child, holistic approach: one of the main goals for an inclusive school is to provide such spaces for informal learning, dialogue, and the development of emotional skills. Inclusive school buildings should not only enable academic excellence, but also prepare students for the outside world by facilitating social communication. When students’ perceptions of the school environment are positive, good behaviours and engagement in learning are more likely (Edgerton et al., 2011).

In the visited schools that use common areas just as an empty circulation space, students’ disruptive behaviours and disaffection seemed to be more frequent. The sense of belonging in students seemed to be more developed in schools where the commons were comfortably furnished as social spaces, and this choice was supported by the collective effort to engage students in a culture of good behaviour and shared well-being.

The libraries of the schools visited present the characteristics of innovation required today by this type of space, which is designed to be sensitive to students’ behaviour, independent work, problem solving and socialisation, and appear to be used to their full potential. The research states that a strong library programme, equipped with mobile technologies and wireless connectivity, a high-quality collection and collaborative relationships between teachers and librarians in planning units, can be an important support for inclusion and, in particular, lead to better student outcomes regardless of the socio-economic or educational levels of the parents (Blackmore et al., 2011).

To conclude this section on the use of the learning environment, it can be said that the well detailed and efficient space organisation promoted by the guidelines presents a good standard solution for a whole-class teaching approach with some opportunity for individualised learning and smaller group activities. Nevertheless, in some cases, the unique-design approach and the furniture provided seem to limit the opportunities for experimenting different solutions, piloting alternative approaches and providing room for innovation.

The necessary process of appropriation of the space provided does not appear to be fully recognised and supported in the schools visited, either by the availability of specific resources dedicated to adapting the space with additional or integrative furnishing or equipment, or by the provision of training or networking and exchange opportunities for the school staff to develop advanced environmental competencies.

An efficient IT infrastructure together with some room left for the school to personalise the technological resources seem to have a higher impact with those teachers that have more confidence in using ICTs, are familiar with project-based learning and are willing to innovate. There is therefore a clear need to bring more teachers, and the schools they are working in, to a state of higher skills in using digital resources and integrating IT into their pedagogical approach.
5. Recommendations

Investments in education infrastructure provide an opportunity for influencing education outcomes. But in order to effectively contribute to support learning, the infrastructure investments must be conceived as intertwined with the education process and implemented jointly. To facilitate the implementation of this combined perspective, a new framework for financing education infrastructure investments has recently been developed (Duthilleul et al., 2021, forthcoming). The framework identifies four distinct phases, from initial planning to use of the building, and identifies a series of activities to be carried out by the education stakeholders during the process. The first phase of the planning process is a time to engage in the development of a shared vision for the school, in order to guide the design choices. The second phase takes place during the construction process, which usually takes around eighteen months. It is a time to be used by teachers to get ready for the new learning environments, to develop their environmental competencies, to test new approaches using classroom prototypes, and to visit other schools. The third phase, or moving-in phase, is a critical time for the school community to appropriate the new spaces and reflect on their own identity and values. The last and fourth space is the time to collect information, both at system and school level, to make the necessary adjustments to make better use of the available environments. This last stage is in fact part of a continuous process of reflection that guides the ever necessary adjustments.

The following recommendations have been structured along the four proposed phases to indicate when they are most appropriate in the planning and construction cycle.

Phase 1: Initial Planning

Developing a shared educational vision

In the early stages of planning a school project, it is important and useful to make available to planners, architects, and prospective users the objectives of the guidance documents and their role in achieving the expected learning outcomes.
Future users should have the opportunity to visit new innovative schools, interview their teachers and students, and learn from their experience. In the same context, cooperation networks and opportunities for the exchange of information with other schools would naturally emerge. The Nordic countries also host a large number of conferences and seminars on learning environments, often accompanied by visits to new schools.

For example, increasing transparency in schools could increase a sense of community and belonging, as well as safety. Transparency could be seen more as a means of building trust and promoting collaboration than as a cause of disruption and visual disturbance. Students can be encouraged to take ownership of the facilities: the spaces and their features, walls and floors, can be used to present and showcase students’ own work results so as to support their self-esteem.

Through its architecture, an innovative school building can also encourage teachers and other users to inspire new ways of working and new teaching methods, and to find a new kind of collaborative work culture. This requires cooperation, courage, open-mindedness and coaching at all levels, on all sides. What is needed is a common understanding of the educational values and pedagogical thinking behind the design palette, the facilities and the variety of learning spaces provided.
Phase 2: Getting Ready

Supporting the development of teachers’ environmental competencies

In the time available before getting into the new building, during the construction process it is important to provide principals and teachers with opportunities to further develop environmental skills and competencies. The whole community can get involved in this preparation phase in order to share knowledge about the new structure and to participate in the construction of an inclusive pedagogical vision. For countries or regions where the school community is not yet identified during works, promoting the development of environmental competencies for all school principals and teachers throughout becomes essential.

The teaching staff should have the opportunity to experience new space solutions and furniture arrangements in order to be able to exploit the pedagogical potential of the new environment once the building is ready. Teachers could also work for a short time in another new school and try out different furnishing models as well as the use of information technology. Opportunities to test and explore the possibilities of new differentiated settings can be provided through collaboration with other schools in the local area or at national level, or by participating in international initiatives such as pilot projects (i.e. initiatives promoted by the European Schoolnet Consortium or by the Erasmus+ Agency⁴) or innovation-oriented networks (i.e. the eTwinning international program). Online training tools can be found to be used in e-learning mode (i.e. the Future Classroom toolkit or specific MOOCs available for teachers) or visits to innovative learning space hubs can be organised to enable teachers to try out innovative IT solutions and flexible learning spaces under the guidance of an expert (i.e. the EUN Future Classroom Lab⁵ in Brussels).

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³ European Schoolnet (http://www.eun.org) is the network of European Ministries of Education, based in Brussels. It is a not-for-profit organisation that aims to bring innovation in teaching and learning to Ministries of Education, schools, teachers, researchers, and industry partners.
⁴ Erasmus+ is the EU’s programme to support education, training, youth and sport in Europe (https://ec.europa.eu/programmes/erasmus-plus).
⁵ The Future Classroom Lab is an experimental learning environment prototype in Brussels, challenging visitors to rethink the role of pedagogy and design in their classrooms (https://fcl.eun.org). The space is used for training workshops and seminars for the intention of teachers and other educational stakeholders.
Enriching connectivity with quality digital content

The availability of appropriate quality content is a prerequisite for making the best use of technology – and thus for its fast penetration in classrooms. Providing access to high quality digital content and good practices, and sharing repositories linked to the national curriculum could prepare the schools to be ready to exploit the potential of the IT infrastructure and connectivity in place. A host of open educational resources (OERs) are already available worldwide: OERs are learning and teaching materials that teachers can freely use and reuse, generally without any charge, and which have limited or unrestricted licensing rights (generally Creative Commons or GNU licences). A significant source of savings from digital technologies lies precisely in the access they provide to a wealth of readily available OERs (OECD, 2007). A European-wide Learning Resource Exchange project (http://lreforschools.eun.org) federates repositories of open educational resources. Other repositories exist worldwide, such as OER Commons (www.oercommons.org) in the United States, which hosted over 200 000 resources as of 2013, including interactive resources for tablets, computers and interactive whiteboards.

A complementary step is to encourage teachers to develop and share OERs themselves, thus supporting the production of digital resources at network or school level.
Phase 3: Moving-in

Clarifying education intentions and values guiding design choices

An interview with teachers and principals at one of the schools visited revealed that the architects who designed the school had been invited to share with the staff their design ideas and visions, as well as the background to the solutions, before the school came into use. According to the teachers, this helped decisively in starting the school’s activities and taking over the facilities. The same practice would certainly work for all schools: city planners and designers could come and explain their design choices to the incoming school community so as to promote better use of the learning environment. This investment becomes even more critical for schools that did not have a chance to participate in the planning and preparation phases.

Conceiving the school as an “Innovation Lab”

Schools could leave some room for the teachers to experiment and try out new solutions and arrangements thanks to flexible furnishing available in one or more dedicated classrooms where testing, exploration and experimentation with colleagues can take place. Such opportunities can enable the development of new solutions where the space setting and the customisation of furniture can support mixed teaching strategies and innovative pedagogies. The objective is to get ready to make full use of the potential offered by the new building.
Considering schools as learning organisations, this is a time for the whole school staff to invest in collaboration and cooperation with persons who are more experienced. It is possible to learn from colleagues or to participate in communities of practice where expertise, concrete solutions and good practices can be shared and know-how can be exchanged. A school that provides opportunities where teachers can develop practices by trial and error and learn from more experienced colleagues is a learning organisation that invests in the professional development of its teachers.

**Developing a sense of belonging**

Moving into a new school building can be an opportunity to create a new sense of belonging and to experience the school with the pride of feeling part of an inclusive and participatory community. Investing in developing school identity and belonging through the introduction of traditional school events and fostering the role of informal learning environments to support socialisation and exchanges can play a key role in developing ‘intangible’ outcomes. These include engagement, social cohesion and feelings of wellbeing.

The interviews with principals and teachers revealed success stories where the opportunity for the school to have some room to influence the building organisation and arrangement led to a more effective ownership process. School principals and staff would gain from being supported in this phase with some resources to make the space their own. A small budget for furniture and personalised IT equipment could have an impact in personalising the given layout and adapting equipment to the vision of the school and could support teachers in exploiting different pedagogical approaches. The given technological infrastructure and connectivity provides a high-quality IT potential and some room to personalise the device solutions or digital resources could further enhance the potential of ICT-enhanced teaching and learning strategies.
Foreseeing some school-level resources for school choices - furniture and IT

A big multicultural world map on the classroom wall created by the pupils at the Scoil Bhride school in Dublin.

Pupil uses IT-based authoring tools to create digital contents.
The given furniture and equipment that come with the school building do not always fully fulfil the needs of the teachers and further action is often required to rearrange the space configuration provided by the architects and interior designers involved in the design phase. Being able to dedicate some resources for some furniture to be integrated in the classroom setting by the teachers would allow for more coherent use of the spaces that takes into account the pedagogical approach of the teachers.

Finally, it is important to exploit the full possibilities of the excellent infrastructure and connectivity provided. Modern technologies facilitate access to high quality digital contents, enable students to communicate with experts in other countries and facilitate internet-based collaboration with other schools in the context of international projects.

At European level, the eTwinning platform (https://www.etwinning.net) offers school professionals and students a range of opportunities to communicate, collaborate, develop projects and share experiences using digital technologies.
Phase 4: Continued adjustments and reflections

At system level

The city’s Education Department could systematically and regularly collect information on the functionality of schools for some time after the facilities are commissioned. The information can be analysed and used in the regular updates of the design guidelines for school buildings. Post occupancy evaluations could be carried out 2-3 years after the schools come into use. Several different POE methods are available for the assessment of facilities. In addition to examining the documents, walking tours of the premises can be organised with the participation of external experts such as educators, maintenance experts and safety experts. The most important thing is to find out how the facilities, their structural features and furnishings correspond to the functional and pedagogical vision of the school.

At school level

The appropriation phase does not end with the moving in of school staff and the beginning of the school year. The building ownership process continues and every new space needs adaptation and adjustment over time to serve the purpose for which it was designed. Initially this process develops through trial and error and individual initiatives, but in the medium to long term some more stable adjustment and monitoring mechanisms could be put in place. Once the new building starts to be used, it is essential for the school to develop a continuous observation process to collect data and feedback from the users of the building to adjust the use of spaces to the specific needs. If teachers are not well prepared and not given leeway for risk taking and failure, they may revert to ‘default pedagogies’ or ‘the way we used to do things’ rather than explore innovative pedagogies (Blackmore, et al., 2011).
Connecting with local researchers

Involving local research centres or universities in the monitoring of the post-occupation phase would help the school to get a more professional dataset and to receive suggestions and directions based on accurate analysis and observation. Schools can take advantage of ad hoc investigation tools designed by specialist researchers. It is not only a matter of outsourcing the development of investigation protocols and data processing, but it also means signing an alliance with the university to introduce a more scientific approach to data analysis. This approach could enable teachers to remain focused on reflecting on and discussing useful solutions for improving the ownership process and customising the space settings in a more effective way.
Creating an internal task force

An internal task force of teachers could be in charge of systematically gathering feedback on the use of space and the adaptations and changes rolled out in the school. Investing in internal resources enables teachers to develop observation skills and foster environmental competences. Having an internal organisation of dedicated teachers helps to orient the efforts of the school staff towards a common objective and serves to gradually build a shared vision of the school. Such an attitude helps the school to become autonomous in evaluating the effectiveness of the different space organisations and furniture layouts and can lead to implementation of the school vision and to building a common understanding of the whole school learning environment.

6. Conclusions

The thematic review of Malmö confirmed some of the findings observed in the two previous reviews carried out by the CEB in Espoo, Finland and Seine-Saint-Denis, France: the value of involving the different stakeholders in the planning process, the importance of supporting teachers in developing the necessary pedagogical environmental competencies, the need to allocate time and resources for the whole school community to appropriate the new spaces and the impact of engaging in a process of continued reflection and adjustments to improve the use of the learning environments and to provide feedback to the planners for future phases of investments.

The case of Malmö also highlighted the need to make the logic behind the design choices and the educational vision guiding the schools very clear. This is necessary to facilitate the work of the principals to pedagogically lead the schools and support teachers in the development of the new practices that are needed today to respond to the demands of the twenty-first century. Transforming practices is not a simple process and to sustain the effort, the logic behind the choices needs to be clear, otherwise it is easier to go back to the old, familiar past.
The review also evidenced the value of complementing the investments in IT infrastructure with a range of different services such as continuing professional development to open teachers to innovative pedagogies and to understand the benefit these technologies can bring to their work, as well as the creation and dissemination of digital resources, to encourage, support and scale up purposeful use of digitally enhanced pedagogical practices. The rich diversity that characterises Malmö was also a distinguishing element of this review and the long experience of the city in integrating students from different foreign backgrounds is recognised. A well-established network of professionals and associations are in place to support the process and the teachers met appear well-equipped to deal with the different language competencies of students, many of them having been trained in Swedish as a second language. The focus of the strategy in place nonetheless seems to be centred on language acquisition, while intercultural education does not seem to be systematically used as a resource to support integration.

This review was confronted with the impact of Covid-19 and the new demands that this has brought to schools and families. Even if the Swedish response to the pandemic has been different from that of other countries in the daily functioning of schools, there are already lessons from the experience that will need to be incorporated into the design of new schools. The need to adapt the physical space to a variable number of students to support social distancing has highlighted the value of a flexible design that can easily adjust to larger and/or smaller needs. Covid-19 has also evidenced the need for designers to review the technical requirements regarding air quality, ventilation, and circulation flows, to avoid unnecessary openings and reduce the surfaces likely to be touched when accessing learning areas and toilets.

The City of Malmö is committed to providing high quality education infrastructure to all its students and has already secured the financial resources to respond to the increasing needs of the coming years. The high professionalism of officials is evident from the quality of the documents and systematic processes in place. We hope the conclusions of this review can encourage the development of a stronger link between the education and architectural efforts to achieve the shared common goal of high-quality learning for all students in Malmö.
Annexes

Annex 1 Data Collection Instruments

A. School Background Datasheet on Teachers and Students

<table>
<thead>
<tr>
<th>Section 1: The school</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Name of school:</td>
</tr>
<tr>
<td>1.2 How long has the Principal been in post at the school? Years:</td>
</tr>
<tr>
<td>1.3 Role of the different actors in latest renovations?</td>
</tr>
<tr>
<td>a. Was the Principal involved? Yes: No:</td>
</tr>
<tr>
<td>b. Were the teachers involved? Yes: No:</td>
</tr>
<tr>
<td>c. Was the support staff involved? Yes: No:</td>
</tr>
<tr>
<td>d. Were the students involved? Yes: No:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 2: About the students at the school</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Total number of students enrolled</td>
</tr>
<tr>
<td>b. Number of nationalities represented at the school</td>
</tr>
<tr>
<td>c. Percentage of students of foreign origin enrolled</td>
</tr>
<tr>
<td>d. Number of foreign students receiving learning support in transitional classes</td>
</tr>
<tr>
<td>e. Number of different home languages spoken at home</td>
</tr>
<tr>
<td>f. Percentage of early school leaving students</td>
</tr>
<tr>
<td>g. Percentage of early school leaving foreign-born students</td>
</tr>
<tr>
<td>h. Total student capacity of the school</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section 3: About the teachers at the school</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Number of teachers employed at the school</td>
</tr>
<tr>
<td>a. Number of teachers</td>
</tr>
<tr>
<td>i) Full-time teaching staff</td>
</tr>
<tr>
<td>ii) Part-time teaching staff</td>
</tr>
<tr>
<td>b. Number of non-teaching staff</td>
</tr>
<tr>
<td>i) Full-time non-teaching staff</td>
</tr>
<tr>
<td>ii) Part-time non-teaching staff</td>
</tr>
<tr>
<td>c. Annual teaching staff turn-over (in percentage)</td>
</tr>
<tr>
<td>d. Number of teachers speaking at least one of the home languages spoken in the school</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3.2 Teachers’ work experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. How long have teachers been at the school (Percentage of total):</td>
</tr>
<tr>
<td>i) Less than one year: ________%</td>
</tr>
<tr>
<td>ii) 1 to 5 years: ________%</td>
</tr>
<tr>
<td>iii) 6 to 10 years: ________%</td>
</tr>
<tr>
<td>iv) More than 10 years: ________%</td>
</tr>
<tr>
<td>b. Teaching experience, percentage that have been teachers for:</td>
</tr>
<tr>
<td>i) Less than one year: ________%</td>
</tr>
<tr>
<td>ii) 1 to 5 years: ________%</td>
</tr>
<tr>
<td>iv) More than 10 years: ________%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3.3 Teacher professional development</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Average number of days per year that teachers are given for professional development activities: _______ days</td>
</tr>
<tr>
<td>b. Number of days that these professional development activities take place:</td>
</tr>
<tr>
<td>i) In the school: _______ days</td>
</tr>
<tr>
<td>ii) Outside the school (e.g. attending courses, seminars etc.): _______ days</td>
</tr>
<tr>
<td>iii) Content focus of training/priority for the school</td>
</tr>
</tbody>
</table>
### B. School: Background Data Sheet

#### Section 1 - The school

**Name:**

Year school building originally constructed:

#### Section 2 - Spatial configuration and size

<table>
<thead>
<tr>
<th>Description</th>
<th>m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total land area of the school site</td>
<td></td>
</tr>
<tr>
<td>Total gross internal floor area of the school buildings</td>
<td></td>
</tr>
<tr>
<td>(total floor area measured to the inside of external walls)</td>
<td></td>
</tr>
<tr>
<td>Proportion of overall floor area for:</td>
<td></td>
</tr>
<tr>
<td>Administrative activities (i.e. not used for teaching / learning activities)</td>
<td>%</td>
</tr>
<tr>
<td>Student activities (i.e. learning and recreation)</td>
<td>%</td>
</tr>
<tr>
<td>Community use only (e.g. parents’ room, healthcare, extended services)</td>
<td>%</td>
</tr>
<tr>
<td>Proportion of the overall floor area used as circulation space (such as corridors, staircases and hallways)</td>
<td>%</td>
</tr>
<tr>
<td>Proportion of the circulation space used for structured or unstructured learning/teaching activity</td>
<td>%</td>
</tr>
</tbody>
</table>

#### Section 3 - New construction / renovation

(new building construction includes a whole new building or a building addition which is a new structure)

<table>
<thead>
<tr>
<th>Description</th>
<th>m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total gross internal floor area (floor area measured to the inside of external walls)</td>
<td></td>
</tr>
<tr>
<td>New building(s) constructed</td>
<td></td>
</tr>
<tr>
<td>Renovated buildings</td>
<td></td>
</tr>
</tbody>
</table>

**Form of procurement:**

**Start and completion dates of construction/renovation works:**

- Start date:
- Completion date:

**Cost of construction project:**

**Total project cost:**

Nature of renovation work:

#### Section 4 - Hours school in use

- Hours or percentage per day during term time the school is used for education
- Hours or percentage per day during term time the school is used for after-school activities
- Hours or percentage per day during term time the school is used for intercultural/integration school activities
- Hours or percentage during the year the school is used by the community
## C. Interview Protocol - Guiding Questions

The interview protocol contained clusters of questions to explore the following aspects:

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pedagogical use of learning spaces</strong></td>
<td>Use of the school spaces considering five main types of places related to school life: each of them represents a specific functional space.</td>
</tr>
<tr>
<td></td>
<td>Group space</td>
</tr>
<tr>
<td></td>
<td>Exploration Lab</td>
</tr>
<tr>
<td></td>
<td>Agora</td>
</tr>
<tr>
<td></td>
<td>Individual area</td>
</tr>
<tr>
<td></td>
<td>Informal area</td>
</tr>
<tr>
<td><strong>Customisation</strong></td>
<td>Characterisation of a learning space with resources, surfaces, students’ artefacts or other signs of belonging representing the users can promote engagement and can deepen learning through a practice of sharing the processes and products of learning in different ways</td>
</tr>
<tr>
<td></td>
<td>Personalisation</td>
</tr>
<tr>
<td></td>
<td>Shared surfaces</td>
</tr>
<tr>
<td></td>
<td>Ownership</td>
</tr>
<tr>
<td><strong>Environmental competencies</strong></td>
<td>Teachers’ awareness of their physical environment and its impact on their activities, as well as their ability to use or change that environment to suit their goals and activities.</td>
</tr>
<tr>
<td></td>
<td>Awareness</td>
</tr>
<tr>
<td></td>
<td>Knowledge</td>
</tr>
<tr>
<td></td>
<td>Manipulation skills</td>
</tr>
<tr>
<td><strong>Technology at the school</strong></td>
<td>Capacity of the school to have a clear vision and strategy deployed in approaching ICTs, to provide access to ICT-based resources (infrastructure, hardware and software, connectivity) and to effectively integrate them in pedagogical practices and for communication purposes.</td>
</tr>
<tr>
<td></td>
<td>Substitution</td>
</tr>
<tr>
<td></td>
<td>Augmentation</td>
</tr>
<tr>
<td></td>
<td>Modification</td>
</tr>
<tr>
<td></td>
<td>Redefinition</td>
</tr>
<tr>
<td><strong>Equity and inclusion</strong></td>
<td>Integration of migrant students and inclusive development of the school’s capacity to offer quality education for all while respecting diversity and the different characteristics and learning expectations of the students, thus eliminating all forms of discrimination.</td>
</tr>
<tr>
<td></td>
<td>Making room for diversity</td>
</tr>
<tr>
<td></td>
<td>Promoting a whole-child approach</td>
</tr>
<tr>
<td><strong>Professional development</strong></td>
<td>Professional development (or related) activities; general responsibility for professional development activities; involvement of teachers in professional learning networks to share ideas about space.</td>
</tr>
<tr>
<td><strong>Impact of COVID-19 emergency</strong></td>
<td>Organisation change during the COVID-19 period.</td>
</tr>
<tr>
<td></td>
<td>Re-organisation of teaching/learning activity</td>
</tr>
<tr>
<td></td>
<td>Space re-organisation and flexibility</td>
</tr>
<tr>
<td></td>
<td>Use of ICTs</td>
</tr>
<tr>
<td></td>
<td>Equity and inclusion</td>
</tr>
</tbody>
</table>
D. Survey - School Director - Space and Use

Section 1: About the founding principles of the school

How does your educational vision translate these principles?
(please describe in no more than 150 words)

- Welcome
- Communication
- Cooperation
- Diversity
- Movement
- Responsibility

Which principle, in your opinion, is most important in supporting the integration of migrants and why?
(please describe in no more than 150 words)

Section 2: About variety of school environments

How have the functional environments described in the 1+4 Manifesto (see: http://www.indire.it/wp-content/uploads/2016/03/ARC-1602-Pieghevole-Ingles_1OW2.pdf for more details) been interpreted in your school
(please describe in no more than 150 words)

- Group learning space
  Group area used by teachers with their students in everyday learning activities (can be a traditional classroom or an open space or any other space configuration)

- Exploration Lab
  Exploration and discovery zone. Dedicated space equipped with specific resources based on discipline or type of tool (i.e. a MakerSpace)

- Agora
  Space for the whole school community where a large audience can participate in public events.

- Individual area
  Individual insight area for concentration. A quiet zone to catch up on work, study, read, write or reflect.

- Informal area
  Area for relaxation and informal meetings usually organised with soft seats and comfort zones for breaks that encourage informal discussion.

Section 3: Types of learning environments

Of the six types of Group spaces described in the 1+4 Manifesto (Traditional classroom, Classroom with internal areas, Flexible classroom, Plus classroom, Cluster classroom, Open educational landscape), please indicate the percentage of each type prevalent in your school.

<table>
<thead>
<tr>
<th>Type of learning environment</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A traditional classroom with rows of desks aligned in front of the teacher’s position</td>
<td>___ %</td>
</tr>
</tbody>
</table>

---


8 This section was adapted by INDIRE from Imms, W., Mhat, M., Murphy, D., & Byers, T. (2017). Type and Use of Innovative Learning Environments in Australasian Schools- ILETC Survey. Technical Report 1/2017. ILETC Project/ Melbourne.
A classroom internally divided into permanent areas based on the type of activity to be experienced

A classroom whose internal area can be reconfigured according to the activities to be carried out thanks to flexible furnishings

The extension of a classroom with additional space (dedicated or shared with another classroom)

The integration of several classrooms and/or labs with an associated shared area used for learning activities

The dissolution of conventional classrooms in favour of large areas that are completely or partially open.
### Section 4: Use of different types of learning activities

Of the 14 types of learning activities, please indicate the percentage of time spent on each approach in your school, with reference to the type of learning environment used

<table>
<thead>
<tr>
<th>LEARNING ACTIVITIES</th>
<th>Traditional classroom</th>
<th>Classroom with internal area</th>
<th>Flexible classroom</th>
<th>Plus classroom</th>
<th>Cluster classroom</th>
<th>Open educational landscape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent study</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
</tr>
<tr>
<td>Online research</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
</tr>
<tr>
<td>Play and movement-based learning</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
</tr>
<tr>
<td>Peer-to-peer tutoring</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
</tr>
<tr>
<td>Mentoring</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
</tr>
<tr>
<td>Small group collaboration</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
</tr>
<tr>
<td>Internet-based collaboration</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
</tr>
<tr>
<td>Student-led performances</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
</tr>
<tr>
<td>Exhibition of works</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
</tr>
<tr>
<td>Experience</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
<td>---%</td>
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<tr>
<td>Interaction with an expert</td>
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<tr>
<td>Discussion</td>
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<tr>
<td>Teacher lecture</td>
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<td>Seminar</td>
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</tr>
</tbody>
</table>

### Section 5.1: Technology at the school

Are the following technologies available in the spaces/rooms in which you teach? (Please tick one box in each row)

<table>
<thead>
<tr>
<th>Technology</th>
<th>In all of the spaces</th>
<th>In most of the spaces</th>
<th>In a few of the spaces</th>
<th>In none of the spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Interactive AV display</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>b) Wireless internet access</td>
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<td>☐</td>
</tr>
<tr>
<td>c) Projector or large TV with audio</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>d) In-school laptops/ notebooks</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>e) Desktop computers</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>f) Tablets (e.g. iPad)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>g) Charge points (for mobile devices)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>h) Cabled internet access</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>i) Printers</td>
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<tr>
<td>l) 3D printers</td>
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</tbody>
</table>

If there are other types of technologies available in the spaces/rooms in which you teach, please briefly describe here:

### Section 5.2: Technology at the school

How often do you use the following technologies in the spaces/rooms in which you teach? (Please tick one box in each row)

<table>
<thead>
<tr>
<th>Technology</th>
<th>Never or almost never</th>
<th>1 to 3 times per month</th>
<th>Once a week</th>
<th>Every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Interactive AV display</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>b) Wireless internet access</td>
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<td>☐</td>
</tr>
<tr>
<td>c) Projector or large TV with audio</td>
<td>☐</td>
<td>☐</td>
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</tr>
<tr>
<td>d) In-school laptops/ notebooks</td>
<td>☐</td>
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<tr>
<td>e) Desktop computers</td>
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<td>f) Tablets (e.g. iPad)</td>
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<tr>
<td>g) Charge points (for mobile devices)</td>
<td>☐</td>
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<tr>
<td>h) Cabled internet access</td>
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<td>i) Printers</td>
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<tr>
<td>l) 3D printers</td>
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</tr>
</tbody>
</table>

If there are other types of technologies available in the spaces/rooms in which you teach, please briefly describe here:

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Sections on “Technology at school” was adapted from *The OECD School User Survey: Improving Learning Spaces Together* (2018).

Section 5.3: Technology at the school

In a typical week, approximately how often do you use technology devices or do you ask the students to use technology devices to do the following learning tasks? (Please tick one box in each row)

<table>
<thead>
<tr>
<th>Task</th>
<th>Never</th>
<th>Once a week</th>
<th>1 to 3 times a week</th>
<th>Everyday</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) online research</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>b) complete an assessment task</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>c) watch a video</td>
<td>☐</td>
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<tr>
<td>d) listen to audio</td>
<td>☐</td>
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<td>☐</td>
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<tr>
<td>e) complete homework</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>f) practice skills</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>g) express ideas creatively</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>h) prepare presentations/reports</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>i) collaborate with students in other schools</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>j) collaborate with students in other countries</td>
<td>☐</td>
<td>☐</td>
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</tbody>
</table>

Section 6. Integration of recently arrived foreign-born students (nyanländ) and inclusive development of the school

6.1 How does your school facilitate the access to information so that recently arrived foreign-born families can consciously choose the school that best suits their child’s needs?

6.2 How does your school build the teaching capacity to support the integration of recently arrived foreign-born students?

6.3 In your opinion what type of skills do teachers need for teaching students from foreign backgrounds?

6.4 How do you promote a whole-child approach to teaching and learning? (learning support to meet students’ needs, management of diversity in school)

6.5 Have you applied for and / or obtained funding to facilitate the integration of foreign-born students, provided by central / top level and local authorities?

6.6 Are there a variety of opportunities for parents/carers to become involved in the school?

6.7 In what way do the characteristics of your school building promote social cohesion and integration between the different ethnic groups in the school?
Annex 2  Technical Characteristics of the Schools Visited

1 Rörsjöskolan

Address: Föreningsgatan 64  
Years of completion: 1/2018 - 5/2019  
Total land area of the school site: 16 344 m²  
Total net internal floor area: 2 569 m² (new building)  
Cost of construction / Total project cost: SEK 51.4 million / SEK 63 million  
Form of procurement: General contract  
Grades: F-6  
Number of students (capacity / enrolled): 625 / 532

The new two-storey, street-linked building completes and supplements the row of buildings along the street. The parklike features of the plot have well been preserved; the centre of the site is dominated by a playground. The architecture of the new school building reproduces nicely the scale, shape, and materials of the surrounding old school buildings on the same site. These other older buildings have teaching facilities, a dining room and a sports hall.

The learning spaces in the new building are arranged on either side of a central corridor; glass windows are used in many parts of the interior of the building to enable the light to penetrate throughout the building. The traffic between the floors is handled via two spacious staircases. Most of the classrooms can be inter connected by means of intermediate doors. The overall impression is a compact, small-scale building where one gets a sense of the connection between spaces.
School design and learning environments in the City of Malmö, Sweden

The school yard and the new school building in the background
1. Types of spaces and their functional use
The arrangement of the learning spaces in the new school building relies on the concept of similarly sized group spaces (classrooms), which can be reconfigured by means of flexible furnishings. Some of the classrooms can be extended with additional adjacent space (dedicated or shared with another classroom) by means of intermediate doors. The library can be connected with the adjacent classroom by a movable curtain. There does not appear to be any plenary space, but the restaurant or the library may be used for that purpose. The corridor seems to be for circulation only and is therefore not used for individual work or as an informal space.

Space proportions* as defined in the “1+4” Learning Manifesto:
- “1” The Group spaces 31%
- “4” The Exploration spaces 5%
- “4” The Plenary spaces (Agora) 5%
- “4” The Individual spaces 8%
- “4” The Informal spaces 6%
* Calculated from the total net area of all four school buildings, including corridors and technical facilities.

2. Connectedness
The floor plans give the overall impression of a traditional school layout with closed classrooms and a central corridor.

a) Adjacency
The classrooms can be connected with smaller rooms for group work or individual work. The slightly noisier spaces, such as the restaurant, are set aside from the classrooms.

b) Connectivity
The school has wireless internet access (Wi-Fi), so working with a laptop is possible everywhere. The students have access to Chromebooks provided by the school. Classroom equipment varies, some classrooms have interactive fixed screens or smartboards but mostly whiteboards are fixed without any internet connection.

c) Transparency and safety
According to the plans, there are glazed windows connected to the classroom doors, giving an open and transparent atmosphere to the school, which contributes to a sense of safety and security. There are two large staircases at either end of each floor for the evacuation of people in case of emergency and a smaller separate staircase at the other end of the building.

3. Flexibility
According to the plans, there are very few supporting walls in the frame construction, which allows the premises to be reorganised as needed.

a) Adaptability
The site of the school is relatively tight, but the building can be extended if the parking lot along the street can be removed. The whole building could also be used for another purpose, such as for offices.

b) Adjustability
The spaces can be easily combined or expanded because of the open building frame, or they can be used for another purpose.
c) Agility
The users can use the spaces flexibly because they have the choice of rearranging the furniture settings or using other appropriate spaces nearby.

4. Inclusion and accessibility
The school has a direct entrance from the street without stairs and there are no level differences within each floor. The lobbies and the corridors are spacious, allowing for the use of wheelchairs or other mobility aids. There is also an elevator between the floors. The acoustics and lighting of the spaces are of good quality.

5. Teachers’ environmental competencies
The school dedicates time to organising learning spaces before the school year begins and teachers are involved in setting up the teaching environments. An experimental and exploratory attitude towards more student-centred teaching methods is present in the school, but is not the norm for all teachers.

The focus group confirms that a number of teachers in the school have a clear vision of the impact of the learning space on student behaviour and are able to manipulate the space configuration to make spatial adjustments that best support the didactic approach and the planned activities.

6. Pedagogical use of learning environments
The furniture is not very flexible so the teachers tend to organise the space with corners and to maintain that organization. The external garden is often used by the teachers as an extension of the group space when the weather enables outdoor education.

The focus group described how a number of teachers split the pupils into groups, assigning them different tasks and using the group space to promote different activities (collaborative or individualised) at the same time and using the different corners and zones set up in the environment.

Informal areas are also included as corners in the group rooms and there is a dedicated informal environment – the studietorg - that is used with teachers for socialisation and play or for after-school activities. The library is currently not used as an informal social environment.

7. Technology at the school
The school provides broadband connection in most of the spaces. Group spaces are equipped with laptops (one-to-one devices) and charging points are available. In the new building the use of ICTs is limited by the young age of the pupils. Multimedia is used as learning content to engage and gather attention (i.e. music, videos, still images, etc.) by using the interactive projectors available in every group space. There is daily use of Google Classroom with older students to assign homework and for communication with parents.

8. Use of the space and learning environment to meet diversity in school
Teachers focus on language as an element of integration and help children needing language support by using images and dramatization in their daily teaching activity. Walls and surfaces are used to facilitate learning and to share knowledge. Pupils’ work is displayed to show the results of the learning activities. In the new building there is a large environment dedicated to music education that is currently one of the main projects aimed at supporting integration and inclusion and promoting self-expression and musical competencies. The informal studietorg is used for after-school activities and socialisation and the large space in front is dedicated to music projects.
Address: Thottsgatan 5
Years of completion: 6/2016 – 6/2018
Total land area of the school site: 14 840 m²
Total net internal floor area: 8 140 m²
Cost of construction / Total project cost: SEK 184.8 million / SEK 231 million
Form of procurement: Turnkey contract in cooperation/partnering
Grades: 7-9
Number of students (capacity / enrolled): 630 / 564

The new school is a four-storey building with a basement. It is located in the corner of the site, completing the harmonious structure of the other buildings on the plot. The elliptical restaurant and library wing protrudes naturally and airily into the school yard. The parklike features of the plot have been well preserved. The architecture of the new school building reproduces nicely the scale and the brick facades of the surrounding buildings.

The elliptical wing with its glass facades dominates the layout of the building; it contains the school’s restaurant, library, art education classrooms, and administration and teaching staff rooms. Most of the learning spaces are arranged on either side of the central corridor. The large central lobby with its spectacular staircase is the heart of this main wing of the school.

Glass windows are used in many parts of the interior of the building to enable the light to penetrate throughout the building. Most of the classrooms can be connected by means of intermediate doors. The overall impression is a visually light, small-scale building where one gets a sense of the connection between spaces.
The main entrance from the school yard
1. Types of spaces and their functional use
The arrangement of the learning spaces in the school relies on the concept of differently sized group spaces (classrooms), which can be reconfigured by means of flexible furnishings. Almost all the classrooms can be extended with additional adjacent space (dedicated or shared with another classroom) by means of intermediate doors. The library has several smaller rooms for group meetings and individual work. The restaurant and the open lobby can be used as plenary spaces. The corridors have furnishings for teamwork or for informal use and relaxation.

Space proportions* as defined in the “1+4” Learning Manifesto:
- “1” The Group spaces 17%
- “4” The Exploration spaces 13%
- “4” The Plenary spaces (Agora) 5%
- “4” The Individual spaces 4%
- “4” The Informal spaces 12%
* Calculated from the total net area of the school building, including corridors and technical facilities.

2. Connectedness
The floor plan is relaxed and flexible - the spaces slide into each other, although the classrooms are mainly enclosed by walls.

   a) Adjacency
   The classrooms can be connected with smaller rooms for group work or individual work.

   b) Connectivity
   The school has wireless internet access (Wi-Fi), so working with a laptop is possible everywhere. The students have access to Chromebooks provided by the school. All the classrooms are equipped with fixed whiteboards on which content can be projected using the Internet.

   c) Transparency and safety
   The use of glazing between the classrooms and the circulation spaces gives an open, inviting and transparent atmosphere to the school, which contributes to a sense of safety and security. There are two large, closed staircases at either end of each floor for the evacuation of people in case of emergency and an open main staircase at the heart of the building.

3. Flexibility
According to the plans, there are very few supporting walls in the frame construction, which allows the premises to be reorganised as needed.

   a) Adaptability
   The site of the school is relatively tight and fully built, which means that there is no space for any extension. The whole building could be used for other purposes, such as cultural activities or for office use.

   b) Adjustability
   The spaces can be easily combined or expanded because of the open building frame, or they can be used for another purpose.
c) Agility
The users can use the spaces flexibly because they have the choice of rearranging the furniture settings or using other appropriate spaces nearby.

4. Inclusion and accessibility
The school has a direct entrance from the street, but one needs to use the stairs in order to get to the entrance floor. Luckily, there are two large elevators on both the courtyard side and on the street side for users with reduced mobility. On the entrance floor there is a slight level difference between the library wing and the classroom wing, but that can be overcome by an elevator connection. The lobby and the corridors are spacious, thus allowing for the use of wheelchairs or other mobility aids. The quality of the acoustics and lighting is of a high level.

5. Teachers’ environmental competencies
The new building initially encouraged teachers to experiment with student organisation (e.g. Individual, groups, whole class, group work) by changing the furniture arrangement but they finally decided to adopt a more lesson-oriented classroom layout. They are aware of the possibility that the organisation of space offers in supporting different teaching and learning methods and are able to detect some critical aspects of the different organisation of classroom spaces, but did not succeed in changing the learning settings to support more innovative and differentiated pedagogies. Classroom layout is quite rigid and no particular changes are made in the preparation of a lesson or during the learning activity.

6. Pedagogical use of learning environments
The group spaces are organised in classroom plus mode: basrums (standard classrooms) and annex grupprums (the “plus” zone), an environment of smaller size providing opportunities for small group work, individual work and moments of relaxation. Both the spaces are equipped with traditional furniture. Furniture layout is not changed during the school. The school has large common spaces that connect classrooms, laboratories and working spaces, but furniture for informal stays is limited to soft seats along the walls or wooden benches around the stairs. Other furnishings have been removed because they were damaged. The need to protect the furniture and building from vandalism influences the use of these spacious informal areas and workstations. There is no provision for group tables or soft social areas in the common areas. Chat rooms (Samtalsroom) for 2-3 people are available in the centre of the common areas, for use by students with the permission of their teachers.

7. Technology at the school
The school provides wireless connection in the whole building. Group zones are connected and provided with charging points, screen projectors and one-to-one laptops. Technology is used to assign tasks, give feedback, roll out multimedia enriched lessons, and promote collaboration among students. Teachers prepare lessons using digital devices and the school promotes the exchange of digital teaching content through an internal sharing infrastructure.

8. Use of the space and learning environment to meet diversity in school
The school provides introductory and reception units, mother tongue teaching and Swedish as a second language teaching for students with foreign backgrounds. Walls and shared surfaces are used to enrich the learning environment with elements from different cultures. The school has a special group of students called “Torget” in which students get targeted help with the objective of joining a regular class. For the moment, there is no provision for holding events for the whole community or involving parents.
School design and learning environments in the City of Malmö, Sweden

December 2020

The main lobby and the staircase

Classroom for arts

Crafts workshop
Tingdammsskolan

Address: Hans Winbergs väg 4  
Years of completion: 12/2016 – 6/2018  
Total land area of the school site: 21 857 m²  
Total net internal floor area: 7 045 m²  
Cost of construction / Total project cost: SEK 138.1 million / SEK 162.2 million  
Form of procurement: General contract  
Grades: F-6  
Number of students (capacity / enrolled): 630 / 485

The school consists of several buildings built in different phases. Building A is the school’s new main building, Building B is the sports hall, and Building D the existing old school building. The other end of Building A was an existing building that has been raised and upgraded.

The new school centre is a narrow, elongated building with a central corridor that twists and turns. This produces a varied and interesting walk through the spaces despite the length of the corridor. The corridor widens into lobbies and squares which can be used for informal study or relaxation. The architecture is modest and small-scale, and the brick used as building material is warm and comfortable to touch.
1. Types of spaces and their functional use

The arrangement of the learning spaces in the school relies on the concept of differently sized group spaces (classrooms), which can be reconfigured by means of flexible furnishings. Almost all the classrooms can be extended with additional adjacent space (dedicated or shared with another classroom) by means of intermediate doors. The library is centrally located and easy to reach. On the other hand, the restaurant is at one end of the school and is therefore a long way from the furthest classrooms. The lobbies can be used as spaces for informal study or relaxation.
Space proportions* as defined in the “1+4” Learning Manifesto:

- “1” The Group spaces 28%
- “4” The Exploration spaces 6%
- “4” The Plenary spaces (Agora) 4%
- “4” The Individual spaces 7%
- “4” The Informal spaces 15%

* Calculated from the total net area of the school buildings, including corridors and technical facilities.

2. Connectedness
The floor plan gives an image or a conception of a medieval town with its narrow alleys and squares for encounters. Although the alley is long, it is always animated and offers a great variety of possibilities for informal events and learning situations.

a) Adjacency
The classrooms can be connected with smaller rooms for group work or individual work.

b) Connectivity
The school has wireless internet access (Wi-Fi), so working with a laptop is possible everywhere. The students have access to Chromebooks provided by the school. All the classrooms are equipped with fixed whiteboards on which content can be projected using the Internet.

c) Transparency and safety
According to the plans, there is some glazing between the classrooms and the circulation spaces that gives an open and transparent atmosphere to the school, which contributes to a sense of safety and security. There is a staircase at each section of the floors for the evacuation of people in case of emergency.

3. Flexibility
According to the plans, there are very few supporting walls in the frame construction, which allows the premises to be reorganised as needed.

a) Adaptability
The site of the school is relatively large, which means that there is still space for an extension or a whole new building. The school could also be used for other purposes, such as office use.

b) Adjustability
The spaces can be easily combined or expanded because of the open building frame, or they can be used for another purpose.

c) Agility
The users can use the spaces flexibly because they have the choice of rearranging the furniture settings or using other appropriate spaces nearby.

4. Inclusion and accessibility
The school has several entrances from the schoolyard, and the first floor is easily reached by using the staircase next to the entrance. In the main entrance there is one elevator for users with reduced mobility.
Within the floors there are no level differences, thus allowing for easy use of wheelchairs or other mobility aids. The acoustics and lighting of the school are of a high level.

5. Teachers’ environmental competencies
The school promotes a vision based on diversified complementary learning environments used by school staff for different curricular and after-school activities. The teachers interviewed have developed a sense of belonging and feel involved in the common aim of getting the best out of the opportunities offered by the building. The collaborative approach is emphasised especially in the lower grades where the potential of the space clusters is used to support communities of pupils of the same age: teachers organise and adapt the layout and the furniture of the different spaces of each age-based cluster thanks to the flexible and moveable furniture provided. Teachers reflect on space organisation on a regular basis. To improve the learning settings they have introduced various elements not foreseen in the original design of the building.

6. Pedagogical use of learning environments
The school is organised in age-based clusters with each cluster including three classrooms with a plus extension, a working area for the teachers to collaborate, and a room for after-school activities (fritids). These environments are located around a shared square (studietorg) to be used for informal situations or open class activities. Group spaces are therefore shaped as classroom plus spaces and organised in clusters. Teachers split the pupils into groups and use the space for different activities (using the classroom and the space extension). Older children can use the plus extension space more autonomously in small groups or individually for concentration. The flexible furniture enables the teachers to create zones and corners in the group space by using mobile panels and wheeled shelves.

The school building offers several opportunities for individual and informal activities: in addition to the grupprums, seats and tables are available in the corridors or on the upper floor of the library (for 6th graders). Informal areas are available in the cluster (studietorg), sometimes as corners in the group spaces or in dedicated environments such as the library, whose initiatives are often integrated in the daily learning activities.

7. Technology at the school
The school provides internet connection in the whole building. All grade group spaces are provided with Chromebooks, charging points and wide screen projectors. Pupils can take the personal devices home and teachers use ICTs with older pupils to promote information literacy and assign tasks to be performed as homework. During lessons, teachers use multimedia to enrich the learning experience and enhance learning, and pupils can express themselves through ICTs and create multimedia products such as videos using images and sounds.

8. Use of the space and learning environment to meet diversity in school
The school provides home language teaching and Swedish as a second language for foreign pupils that need language support. The level of integration is also quite good because the area hosts families with good instructional levels and socio-economic backgrounds. The school has developed an identity and pupils from different backgrounds feel part of the school community. The school has a focus on special needs students with specific spaces where dedicated teachers develop targeted activities.
The school restaurant

The classroom for textile work
Hyllievångsskolan

Address: Ymers gata 4
Years of completion: 8/2015 – 3/2017
Total land area of the school site: 19 484 m²
Total net internal floor area: 8 396 m²
Cost of construction / Total project cost: SEK 179 million / SEK 210.7 million
Form of procurement: General contract
Grades: F-6
Number of students (capacity / enrolled): 630 / 260

Hyllievångsskolan is located in the growing new neighbourhood on the border between the city and the countryside. The building is therefore designed to be a link to the history and present of the place. Towards the city, the school’s facade is made of brick, but towards the schoolyard and the park it changes character to become a wooden facade. The curved shape of the building frames the outdoor environment as a traditional provincial yard, but also creates a welcoming entrance square for visitors.

In one corner of the block, the school’s wall-like facade is broken up by a large frame in red. This is the main entrance, which opens the school on three floors like a wedge through the building. The views and insights into all the school’s activities from the entrance make it easy to orientate oneself in the building.

The school yard is well equipped for games, play and outdoor teaching.
School Design and Learning Environments in the City of Malmö, Sweden

December 2020

Facade from the street side

School yard

Amphitheatre of the main lobby
1. Types of spaces and their functional use
The building’s boomerang shape allows for a versatile arrangement of the premises. The learning spaces and classrooms can be reconfigured by means of flexible furnishings. The lobbies and corridor spaces can be used for teaching and informal studies in a variety of ways. Almost all the classrooms can be extended with additional adjacent spaces (dedicated or shared with another classroom) by means of intermediate doors. The library and the mediatheque are centrally located and easy to reach. Adjacent to the main entrance is the heart of the building where stairs and gradients can be used as an amphitheatre. At the back and bottom of the large corridor widenings there are niches that create nooks and small spaces for sitting and informal study or relaxation.

Space proportions* as defined in the “1+4” Learning Manifesto:
- "1" The Group spaces 30%
- "4" The Exploration spaces 5%
- "4" The Plenary spaces (Agora) 3%
- "4" The Individual spaces 7%
- "4" The Informal spaces 18%

* Calculated from the total net area of the school building, including corridors and technical facilities.

2. Connectedness
The floor plan is in many ways open, although most of the classrooms are enclosed by walls. The spaces flow easily into each other and into the open lobbies.

   a) Adjacency
   The classrooms can be connected with one another and with the adjacent smaller rooms for group and individual work.

   b) Connectivity
   The school has wireless internet access (Wi-Fi), so working with a laptop is possible everywhere. The students have access to Chromebooks provided by the school. All the classrooms are equipped with fixed whiteboards on which content can be projected using the Internet.

   c) Transparency and safety
   According to the plans, there is some glazing between the classrooms and the circulation spaces that gives an open and transparent atmosphere to the school, which contributes to a sense of safety and security. There are also several closed staircases for the evacuation of people in case of emergency.

3. Flexibility
According to the plans, there are very few supporting walls in the frame construction, which allows the premises to be reorganised as needed.

   a) Adaptability
   The site of the school is relatively large, which means that there is still space for an extension. The school or parts of it could also be used for other purposes, such as cultural activities.

   b) Adjustability
   The spaces can be easily combined or expanded because of the open building frame, or they can be used for another purpose.
c) Agility
The users can use the spaces flexibly because they have the choice of rearranging the furniture settings or using other appropriate spaces nearby.

4. Inclusion and accessibility
The school’s motto is to be a school and a versatile activity centre for everyone, and this goal is well implemented and achieved. The school has several entrances from both the street side and the schoolyard, and, when entering, it is easy to visualise the school’s activities and orientate within the school. In the main lobby there is one elevator for users with reduced mobility. Within the floors there are no level differences thus allowing for easy use of wheelchairs or other mobility aids. The quality of the acoustics and lighting is of a good level.

5. Teachers’ environmental competencies
Teachers are aware of the impact of the learning environment on learning and quality of life in the school. They are able to detect what aspect of the environment can be critical for children and how to exploit the potential of the different areas of the learning space. Even if they were not involved in the pedagogical concept behind the building, teachers explore and try to change the furniture layout depending on type of activity or pupils’ age, and continuously try to find the best space configuration. The furniture is not very flexible and cannot be rearranged on the fly during lessons.

6. Pedagogical use of learning environments
The school building is organised in learning clusters, with some classrooms grouped around a shared informal space (Allrum), which enables teachers to involve pupils of the same age in open-class activities. Each cluster includes a working area for the teachers to collaborate and plan common learning activities. The heart of the school is the school library on the first floor, connected to the stair-agora where wider groups can attend seminars or share some moments of school life. The dining room or the music hall are used for plenary events when a wider audience needs to attend.

Soft corners, small agoras and carpets are available in the school for informal meetings or for after-school activities. The spaces are easily reachable from the group spaces. The school has set up some personalised areas (i.e. in the library) for the teachers to experiment maker activities with children such as Lego educational games or other ICT-enriched explorative activities.

7. Technology at the school
The school provides internet connection in all learning environments and wide screen projectors are available in every classroom. Every child has a personal device even if its usage is limited in the first two years of the F-6 levels due to the young age of the children. From year 2, children start to take home their personal devices. Teachers use videos and audio content on the classroom projector for daily lessons. The school has started some experiments in the creative use of technologies.

8. Use of the space and learning environment to meet diversity in school
The school has a special focus on the inclusion of special needs students. It adopts a direct integration approach with regular classes of students getting support in their mother tongue when needed. Well-equipped informal spaces are used for the welcome and start-up of the morning activity and for after-school activities (fritids). The comfortably equipped shared common spaces (Allrum) are important socialisation places for groups of students of the same age and are also used for common activities. The library can be used to bring the school community together and involve children and parents in the school life through reading activities and cultural events.
Library

Crafts workshop
Toftanässkolan

Address: Lönnebergagatan 55
Years of completion: 6/2017 – 10/2019
Total land area of the school site: 13 000 m²
Total net internal floor area: 9 011 m²
Cost of construction / Total project cost: SEK 186 million / SEK 234 million
Form of procurement: General contract
Grades: F-9
Number of students (capacity / enrolled): 650 / 393

Toftanässkolan is located in the new residential area of Gyllins Trädgård bordering on a large green belt. The building is designed in a T-shape. The northern wing connects to the street with an easily detectable main entrance. This leads to the central lobby that connects the three floors of the building. A large skylight brings light down through a curved staircase that runs from floor to floor. The main lobby is directly connected to the school restaurant, library, administration, and staff rooms. The main entrance also serves as an entrance for grades 7-9, whose premises and special halls are adjacent to this section. The southern wing contains home areas for grades F-6. The building shares out part of the school yard for some of the youngest grades and another part for the older students, with separate entrances from either side. There is a separate sports hall close to the school.

The facades are walled with a hard-burnt shaded black brick. The bay windows and entrance protrusions are clad with facade clinkers in mustard yellow and grey-green shades. The roofs are coated with matt rolled aluminium and moss sedum.
School design and learning environments in the City of Malmö, Sweden
December 2020

The site plan

The aerial view
1. Types of spaces and their functional use
The school’s architectural concept is based on a narrow, elongated building frame with a central corridor. The long corridors are enlivened by regularly placed corridor widenings that serve as lobby spaces, which can be used for informal study and relaxation. The restaurant and the library are located at the ends of the building wings which leads to long distances from the farthest parts of the school. The learning spaces and classrooms can be reconfigured by means of flexible furnishings. The corridor widenings can be used for teaching and informal studies in many different ways. Almost all the classrooms can be extended with an additional adjacent space (dedicated or shared with another classroom) by means of intermediate doors.

Space proportions* as defined in the “1+4” Learning Manifesto:
- “1” The Group spaces 28%
- “4” The Exploration spaces 7%
- “4” The Plenary spaces (Agora) 4%
- “4” The Individual spaces 7%
- “4” The Informal spaces 11%
* Calculated from the total net area of the school buildings, including corridors and technical facilities.

2. Connectedness
The floor plan gives an impression of a rather traditional school layout with closed classrooms and a central corridor. This is alleviated by the widenings in the corridors. The classrooms are mostly enclosed by walls.

a) Adjacency
The classrooms can be connected with each other and with the adjacent smaller rooms for group and individual work.

b) Connectivity
The school has wireless internet access (Wi-Fi), so working with a laptop is possible everywhere. The students have access to Chromebooks provided by the school. All the classrooms are equipped with fixed whiteboards on which content can be projected using the Internet.

c) Transparency and safety
According to the plans and videos, there is some glazing between the classrooms and the circulation spaces that gives an open and transparent atmosphere to the school, which contributes to a sense of safety and security. There are several closed staircases for the evacuation of people in case of emergency.

3. Flexibility
According to the plans, there are very few supporting walls in the frame construction, which allows the premises to be reorganised as needed.

a) Adaptability
The site of the school is relatively large, but an extension could hamper the functions of the schoolyard, now designed for very versatile and different activities. The school, or parts of it, could also be used for other purposes, such as cultural activities or for office use.

b) Adjustability
The spaces can be easily combined or expanded because of the open building frame, or they can be used for another purpose.
c) Agility
The users can use the spaces flexibly because they have the choice of rearranging the furniture settings or using other appropriate spaces nearby.

4. Inclusion and accessibility
The school has several entrances from either side of the building, and the first floor is easily reached by using the staircase next to the entrance. In the main entrance there is one elevator for users with reduced mobility. Within the floors there are no level differences, thus allowing for easy use of wheelchairs or other mobility aids. The quality of the acoustics and lighting is of a good level.

5. Teachers’ environmental competencies
Principal and teachers experiment with space settings, reflect on the best use of space and propose the furnishing solution that could improve the learning environment and support active learning. The school staff participates in the organisation of the learning space and is aware of the impact of the learning environment on students’ behaviour and school life. Teachers in general adapt the group space settings depending on the type of activities to be rolled out and some adjust and change the flexible furnishings on the fly during the lessons.

6. Pedagogical use of learning environments
The part of the building dedicated to the first six grades of the school (F-6) is organised in clusters with a central, comfortably furnished home base that serves three classrooms. The cluster works as an internal school community with a wardrobe and a working room for teachers. The group spaces are made up of a basrum and a grupprum forming a classroom plus configuration. Teachers use the home base of the basrum for learning activities and sometimes work with open classrooms, exchanging pupils from different class groups. For higher grades (7-9), a home base informal space is not available, but external spaces such as the well-equipped library are also used for learning activities. The group spaces (basrum+grupprum) are organised in internal zones and corners for small group work or for individualised learning. The flexible furniture (chairs with wheels, mobile panels, soft seats) are easily moveable and enable teachers to rearrange or adapt the learning setting. In the lower levels, the outdoor green space is also used for educational activities.

7. Technology at the school
The school provides internet connection in the whole building. The higher grades use Chromebooks as one-to-one devices while the lower grade pupils are provided with iPads. Students perform tasks assigned by teachers using their personal devices and some apps are used as learning resources for activities linked to the curriculum. Pupils use their devices to search the Internet under teachers’ guidance and sometimes build their knowledge by creating multimedia products.

8. Use of the space and learning environment to meet diversity in school
The school provides home language teaching and Swedish as a second language for students with other mother tongues. The school emphasises the importance of creating a welcoming learning environment for students. The principal and teachers understand the importance of cultural linguistic diversity as a resource and parental involvement is considered an important aspect of integration. The school does not face a critical situation concerning the inclusion of diversity issues. In general, families living in the area where the school is located have a good socio-economic background and a high level of instruction so that students with foreign origins seem to be well integrated into Swedish society.
School design and learning environments in the City of Malmö, Sweden

Entrance to the library

Classroom of the F-6 grades
References


