

CELE Exchange, Centre for Effective Learning Environments
2010/03

European Design Types for 21st Century Schools: An Overview

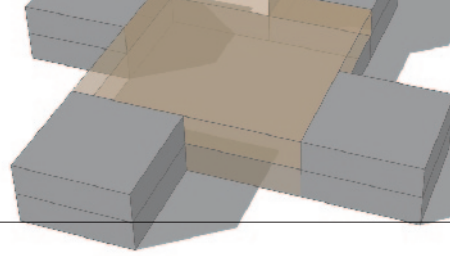
Alessandro Rigolon

https://dx.doi.org/10.1787/5kmh36gpvmbx-en

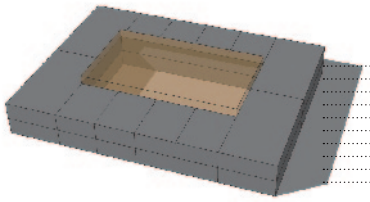
OECD

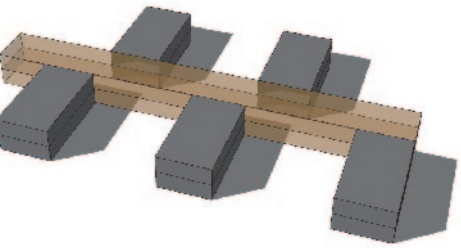
CELE
OECD Centre for Effective Learning Environments
(formerly OECD Programme on Educational Building)

ISSN 2072-7925
European design types for 21st century schools: an overview
CELE Exchange 2010/3
© OECD 2010



European design types for 21st century schools: an overview



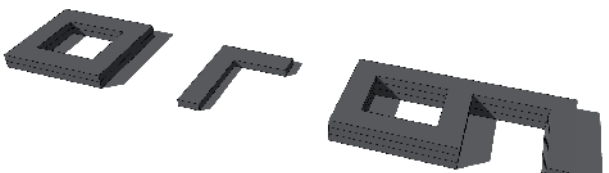


By Alessandro Rigolon, University of Bologna, Italy

This article presents a critical overview of European school building design types, based on an analysis of morphologies and spatial layouts. The different design types are evaluated in function of specific didactic and social needs.

AN OVERVIEW OF EUROPEAN SCHOOLS

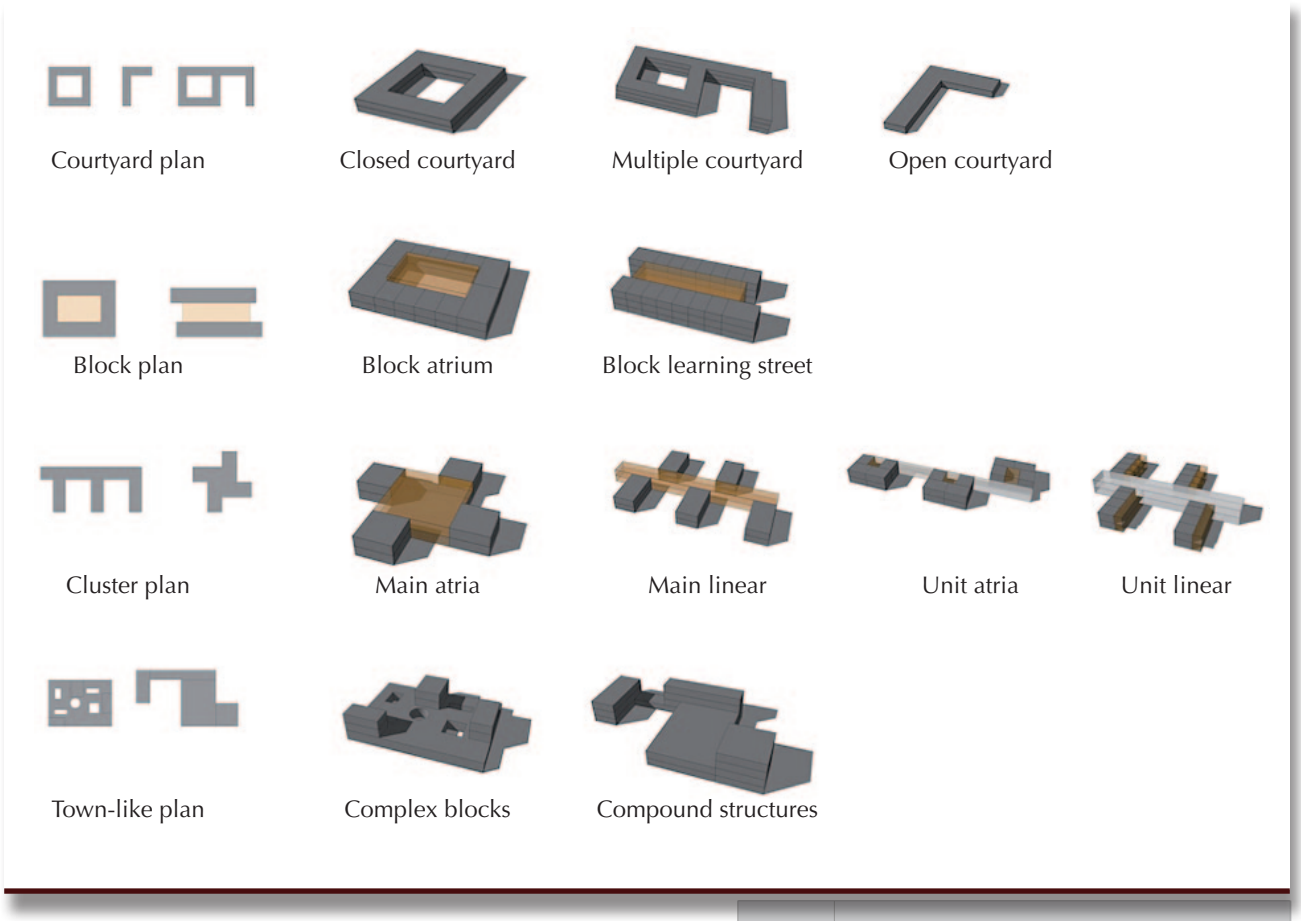
The wide diversity of school buildings conceived over the last 10-15 years illustrates the use of morphological and spatial patterns, some of which follow traditional types whereas others differ from them. The choice of a given type will depend on the specific characteristics of the school, the level of education and the number of pupils. But it will also depend upon the school's educational philosophy, climatic conditions and its location in the region (urban, suburban or rural). In particular, the pedagogical type, which encompasses different learning modalities, usually has a strong influence on the spatial layout of the building. For example, flexible open plan classrooms which are chosen in preference to the traditional cell-type plan would entail careful consideration of the notions of served spaces and servant spaces. Also, the growing demand for areas dedicated to breaks and collaborative work means that circulation spaces need to be rethought and enlarged in order to host learning activities. Nevertheless, the decision to design a school building according to a pedagogical type can be quite risky because school principals tend to change frequently, at least in Italy. For this reason, it seems that an effective strategy would be to define guidelines that identify design and didactic criteria.



DESIGN TYPES: AN INTRODUCTION

The starting point for this definition of general design patterns for educational facilities was a body of research, based on the analysis of international case studies. The research focused on school buildings that presented innovative factors in the field of spaces for learning and socialising. It led to the identification of four design types: the courtyard type, block type, cluster type and town-like type (Figure 1). It is important to note that the basic criteria for the elaboration of these types were **morphology** and **internal layout.** These latter aspects strongly influence the characteristics of some spatial patterns which are fundamental to the planning process of school buildings. They include, for instance, the hierarchy between the various spaces within the facility and the co-existence of classrooms (or their evolution) and the semi-private areas nearby.

Figure 1. School building design types



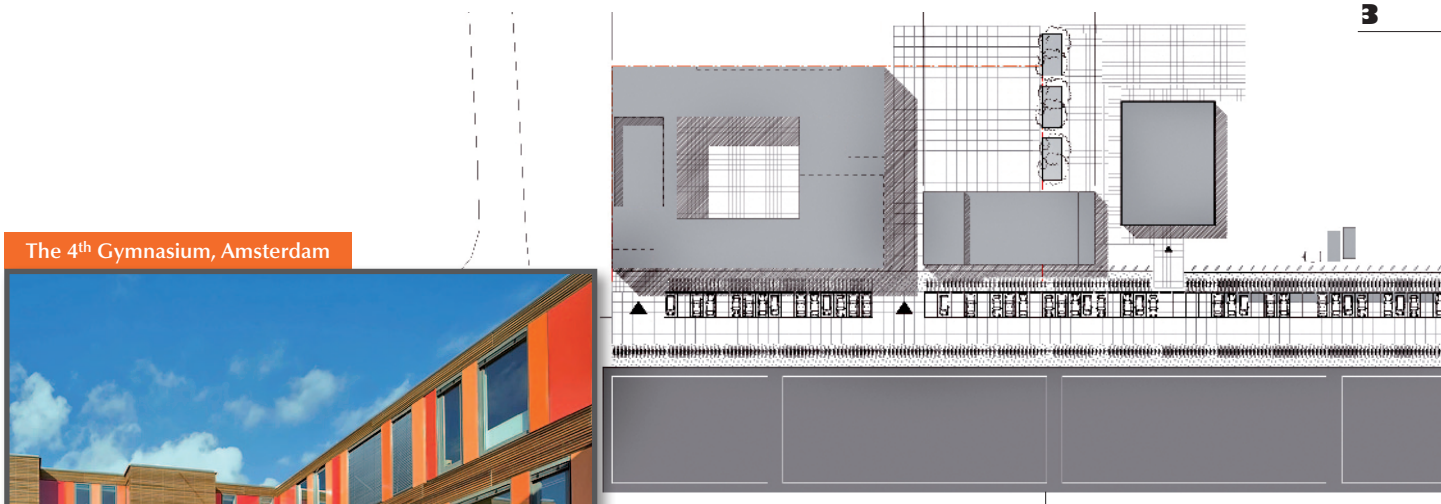
THE COURTYARD TYPE

The courtyard type, one of the most frequently used in the past, is still on the cutting edge for schools that consider external spaces very important. In fact, although there are variations, the standard characteristic of this type is a protected outdoor area that can be easily surveyed and is psychologically reassuring. This type has the two major effects: first, it contributes significantly to the creation of a sense of ownership within the school community; second, it provides a visual focus for the interior spaces: the feeling of being inside a closed area, with different degrees of opening, generally brings an impression of well-being.

Three sub-types were identified during the research evoked above: single courtyard, enclosed and open, and multiple courtyards. Their volumes usually follow a linear pattern, and form one or more grounds. The choice to leave open or to enclose the exterior spaces, thereby forming a microcosm, depends above all on the location. In urban areas "protected" grounds are preferred, as in the 4th Gymnasium,[1] Amsterdam, or in the Castelldefels School,[2] Barcelona. On the other hand, where the rural or suburban landscape is an important element, L- or U-shaped open courtyards are often used. The preschool in Chaource,[3] France, for example, follows this layout.

Since the school grounds are the main area where socialising takes place, the interior commons are usually designed as mere circulation spaces: most buildings follow the outdated traditional layout, with a corridor that gives access to the classrooms.

3



© HVDN architecten

The 4th Gymnasium, Amsterdam



© John Lewis Marshall
(*www.johnlewismarshall.com*)

1. Hvdn Architecten, 2008, the Netherlands.
2. Carme Pinós, 2006, Spain.
3. C. Colomès and F. Nomdedeu Architects, 2009, France.

THE BLOCK TYPE

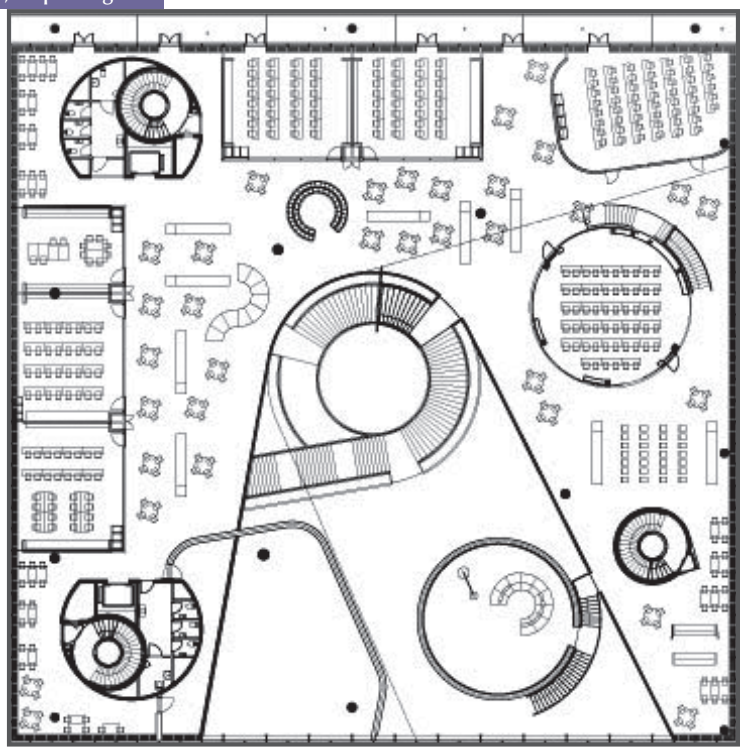
The block type is characterised by compact volumes and simple internal layouts. A second major feature of this type is a large (and unique) space for socialising leading directly to the main learning spaces (classrooms, studios, laboratories). In the Hazelwood School,[4] Glasgow, the simplicity of the circulation scheme, a winding internal street, is designed to facilitate the sense of orientation of people with multiple disabilities. This type, with its different configurations (the central atrium and the "learning street"), tends to optimise the circulation areas and provides for a flexible layout of didactical spaces.

The Ørestad College[5] in Copenhagen, which is almost a classroom-free building, is shaped around a central void where a complex system of stairways gives access to open areas for learning and breaks. The space is can be used for different activities simultaneously and offers practical access to the other parts of the building. The effectiveness of this type is based on the condition that the main socialising space is truly inhabited by students: if this space did not offer multiple and flexible possibilities for activities to take place, it would simply be a circulation area, and become a "serving space".

© Adam Mørk

Ørestad College, Copenhagen





© 3XN

A typical example of a learning street can be found in the Montessori College Oost,[6] Amsterdam: it has a number of remote spaces, and areas for informal learning are located in a volume spanning from the ground to the top floor. This makes the street a vibrant place, especially when pupils move from one classroom to another.

Given the prevalence of internal areas for spontaneous meetings, buildings built on the block type can be considered as covered courtyard edifices. This assertion is supported by the fact that, in cold climates, usage of the central atrium and learning street types is clearly greater than that of courtyard types. The Westminster Academy,[7] London, is a good example of this typology. All the learning and service spaces are arranged around a large hall, the social heart of the school.

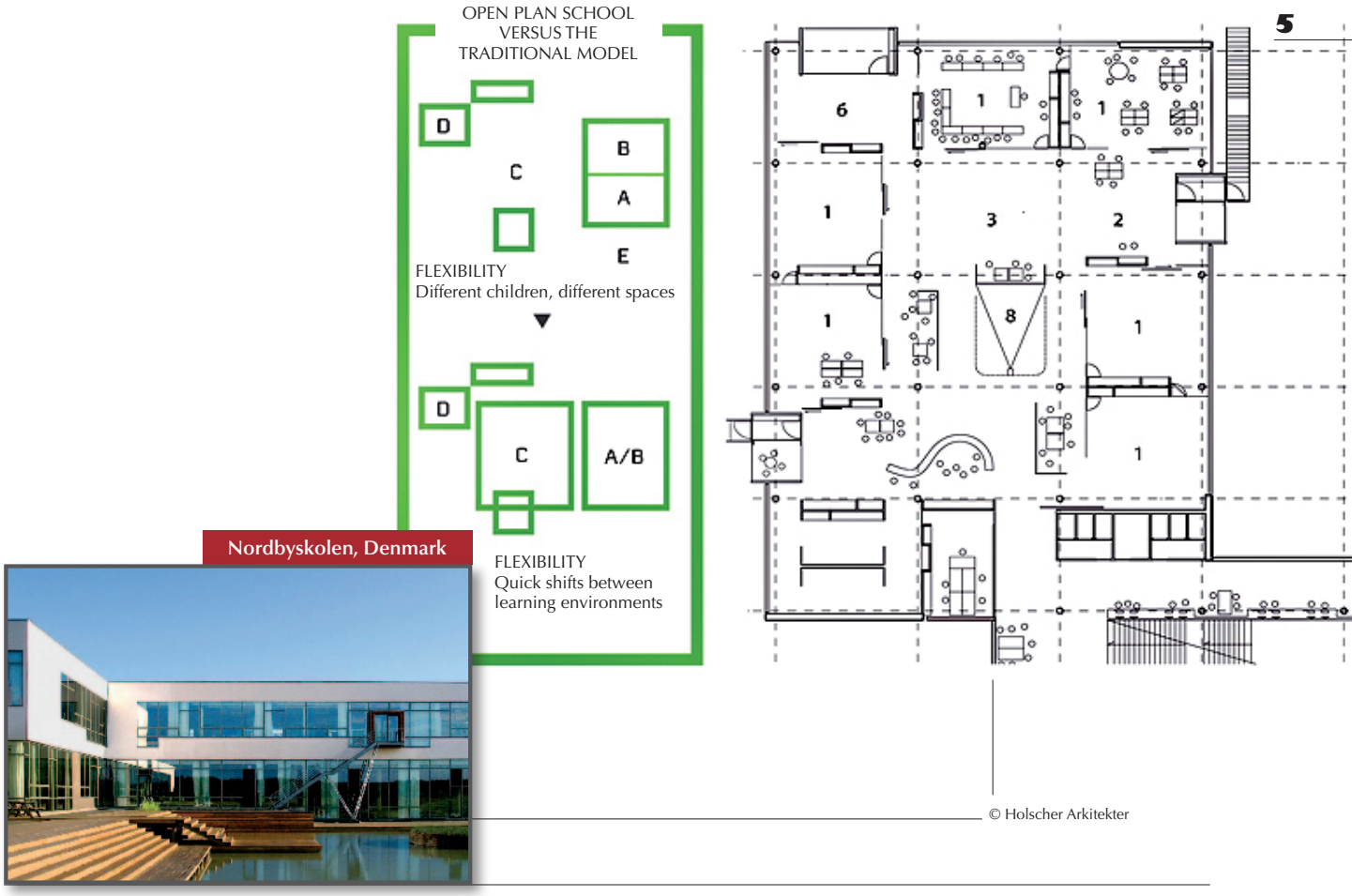
4. Gordon Murray and Alan Dunlop Architects, 2007, United Kingdom.
5. 3XN Architects, 2007, Denmark.
6. Architectuurstudio Herman Hertzberger, 1999, the Netherlands.
7. Allford Hall Monaghan Morris, 2007, United Kingdom.

THE CLUSTER TYPE

The main feature of the cluster type is that the building is fragmented into different volumes, which can represent independent pedagogical units. If a range of spaces that go beyond the traditional classroom is provided, these units can be considered as "small learning communities" (SLC). Every "school within a school" usually has a particular spatial character, the aim being to make it more recognizable and to enhance a sense of belonging.

The cluster type has a number of variations, depending on the circulation scheme, both at the level of the building as a whole and the pedagogical units: it can have either a longitudinal layout or central atria. The Kastellet Primary School,[8] Oslo, and the Nordbyskolen,[9] Denmark, are respective examples of those variations. Volumes in atria sub-types are more compact and, consequently, distances within the building are reduced; moreover, the circulation areas can become active spaces for learning.

Unlike the block type, in the cluster type movement from the private to the public areas is filtered by the commons which are a feature of every SLC; these buffer spaces play a key psychological role for pupils because they enable them to identify themselves in a small group, gradually transiting towards the rest of the building. Finally, the independent volumes need to be linked by a general gathering place, defining the public character of the building, as in Thomas Deacon Academy,[10] England. In this facility a large covered hall is the unifying element that connects up with all the pedagogical units.



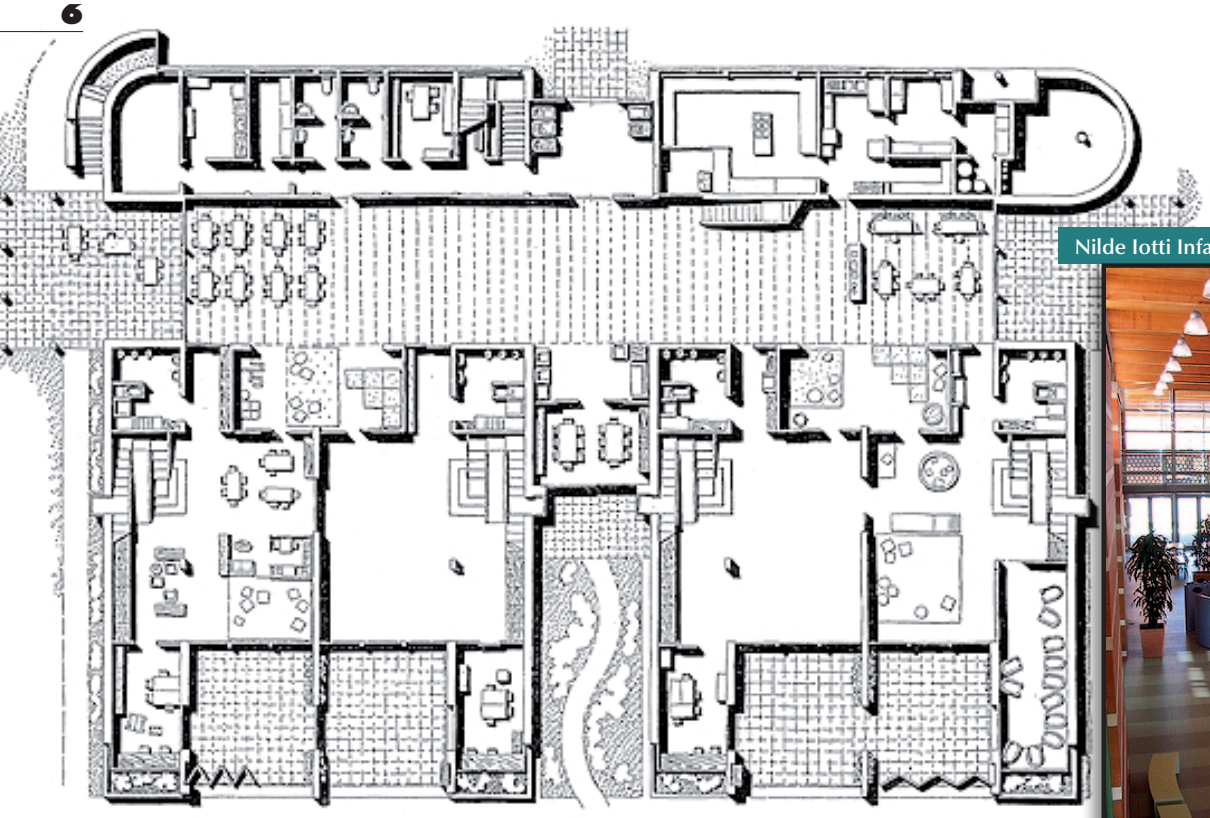
8. Div. A Arkitekter, 2004, Norway.
9. Holscher Arkitekter, 2004, Denmark.
10. Foster and Partners, 2007, United Kingdom.

THE TOWN-LIKE TYPE

The town-like type is characterised by a multiplicity of spaces and functions, hence the metaphor of the town. The most public space, the "town hall square", is surrounded by the most important "buildings" (library, auditorium). From here, a series of roads gives access to spaces that are more and more "private" and resemble an organic pattern rather than the cluster type. For instance, in the Kingoskolen,[11] Denmark, the central area, which acts as the main social hub of the school, is connected by a series of paths to the basic learning units.

A wide variety of case studies that can be considered town-like has led to the identification of two sub-types. First, there are the "complex blocks", often single-storey buildings, which have quite a compact footprint. In such cases the metaphor of the town is materialised in a combination of interior spaces. The Jatta Vocational School,[12] for example, consists of a cubic volume and a number of patios that bring daylight into even the most interior areas. Within this "box", the circulation layout is structured in different spaces, with "squares" and "streets". Another building that can be assimilated to this type is the day nursery Iotti,[13] Reggio Emilia, Italy, which is characterised by a large central plaza that creates vistas towards the school grounds.

Second, there are "compound structures", formed by a variety of freely arranged volumes. The notion of urban space is created both by the complexity of the internal spaces and the richness of the three-dimensional shapes. The Aurinkolahti School,[14] Helsinki, is a good example of this typology.



Architecture and design: Tullio Zini Architetto

Nilde Iotti Infant-toddler Centre, Reggio Emilia



11. Rubow arkitekter, 2006, Denmark.
12. Henning Larsen Tegnestue, 2007, Norway.
13. Tullio Zini Architetto, 1999, Italy.
14. Raimo Teränne architects, 2002, Finland.

A BRIEF COMPARISON OF DESIGN TYPES

After having defined and described the main design types for school buildings, it would be useful to compare these types based on various relevant considerations.

The **optimization of the net to gross ratio**[15] is a fundamental consideration, given the tight budgets allocated to the construction of schools. First, it is important to note that the building codes currently in force and many architectural manuals generally assimilate circulation space with "serving spaces". In fact, as illustrated in a number of buildings, most of these areas, if properly designed, can also become learning places,[16] *i.e.* places with a specific purpose rather than thoroughfares. One consequence of this versatility can be saving of square footage.

In this regard, block type buildings perform best. Cluster and town-like types, if they are laid out with central atria, can also be very effective. Courtyard types, on the other hand, tend to waste a lot of circulation space, since they are usually laid out according to the traditional narrow corridor-classroom pattern.

With regard to **building density,** the body of research showed that block types are more likely to be used in urban areas because of their compact footprint and because they can be placed in unfavourable locations, for example, next to infrastructures, because of their introverted style. Unlike the block type, the courtyard, clusters and town-like types are more popular in suburban and rural settings because they generally require a larger lot/floor ratio.

As regards **educational levels,** block types are more appropriate for high schools, since their curricula requires groups of students to use a large number of different spaces during the day. Every hour students migrate to and from different rooms, therefore the socialising spaces are full of life. The cluster and city-like types are more likely to be adopted for elementary school and pre-school buildings: in fact, the gradual passage from the private to the public realm and the presence of small community spaces close to the classrooms are very appropriate for children. Day nurseries and kindergartens in particular often follow the complex block type, combining the richness of internal spaces with the easy management of a single-storey building.

The use of **school grounds for learning activities**, when they are protected and solidly connected with the interior, has become increasingly important in the context of environmentally conscious education. Many pedagogical experiences in northern Europe, both past and present, are based on life in the open air.[17] Only the block types have some questionable aspects because the volumes do not usually give rise to intimate exterior spaces. On the other hand, the courtyard type, by nature, emphasizes the importance of external areas, making it a central topic both from the architectonic and educational points of view.

In conclusion, notwithstanding the diversity in school building designs, approaches to these designs tend to evolve towards a new vision of learning environments that is in step with the latest pedagogical thinking. Learning methods based on project-based activities[18] that actively involve students, rather than the simple transmission of knowledge, are gaining popularity. This has led to two important

15. Didactic square footage divided by total square footage.
16. Hertzberger, H. (2008), *Space and Learning,* 010 Publishers, Rotterdam.
17. Châtelet, A-M., D. Lerch and J.N. Luc (2003), *Open-Air Schools: An Educational and Architectural Venture in Twentieth-Century Europe,* Recherches, Paris.
18. Gardner, H. (2005), *Educazione e sviluppo della mente. Intelligenze multiple e apprendimento.* Erickson, Trento.

consequences which impact on the design of buildings. First, the traditional classroom is now no longer the only space for learning, since it can host only a limited number of teaching activities. Second, it has brought about a general rethinking of building layout and led to greater, effective flexibility in the use of spaces.

These seem to be the major challenges of designing today's and tomorrow's schools.

Bibliography and web resources

Châtelet, A., D. Lerch and **J.N. Luc** (2003), *Open-Air Schools: An Educational and Architectural Venture in Twentieth-Century Europe,* Recherches, Paris.

Gardner, H. (2005), *Educazione e sviluppo della mente. Intelligenze multiple e apprendimento,* Erickson, Trento.

Hertzberger, H. (2008), *Space and learning*, 010 Publishers, Rotterdam.

Nair, P. and **R. Fielding** (2005), *The Language of School Design. Design Patterns for 21st Century Schools*, Design Share, Minneapolis.

Thornburg, D. (1999), *Campfires in Cyberspace,* Starsong Publications, Lake Barrington, IL.

www.designshare.com

www.imagineschooldesign.org

For more information, contact:
Alessandro Rigolon
PhD student
Department of Architecture and Urban Planning
Faculty of Engineering
University of Bologna
Via Risorgimento, 2 – 40136 Bologna
Italy
Tel.: 39 (0)51 2093155
E-mail: alessandro.rigolon2@unibo.it

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where the governments of 30 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

This work is published under the responsibility of the Secretary General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the Organisation or of the governments of its member countries.

ISSN: **2072-7925**

Corrigenda to OECD publications may be found on line at: *www.oecd.org/publishing/corrigenda*.

© OECD 2010

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of OECD as source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to *rights@oecd.org*. Requests for permission to photocopy portions of this material for public or commercial use shall be addressed directly to the Copyright Clearance Center (CCC) at *info@copyright.com* or the Centre français d'exploitation du droit de copie (CFC) *contact@cfcopies.com*.