■ ELEMENTARY SCHOOLS
AVERAGE GOSS AREA IN M2 / STUDENT PLACE

Grouping of facilities by function	6 Cl.	12 Cl.	18 Cl.	24 Cl.	18 Cl.	24 Cl.	30Cl.	36Cl.
Population density	Low density (rural)			High density (urban)				
Teaching and pedagogic support (pre-primary)	6.89	6.07	6.39	7.66	4.94	5.16	5.22	5.12
Teaching and pedagogic support (Primary)	3.86	3.39	5.04	4.99	4.28	4.10	3.98	3.86
Optional facilities	0.00	0.23	0.27	0.90	0.03	0.51	0.67	0.56
Total including circulations without optional facilities	4.37	3.84	5.27	5.43	4.39	4.28	4.19	4.07
Total including circulations with optional facilities	n.a	4.07	n.a.	4.07	5.54	6.33	4.42	4.79

TABLE 2.4

■ BASIC EDUCATION SCHOOLS
AVERAGE GOSS AREA IN M2 / STUDENT PLACE

Grouping of facilities by function	20 CL.	30 Cl.	30 Cl.	**40 CL.**
Population density	Low density (rural)		High density (urban)	
Teaching and pedagogical support pre-primary	5.14	4.82	4.16	4.24
Teaching and pedagogical support (primary)	3.48	3.43	3.82	3.80
Teaching and pedagogical support (lower secondary)	11.56	10.75	7.21	6.90
Administration	0.56	044	0.29	0.22
Common services	0.98	0.91	0.87	0.85
Total including circulations	**8.42**	**7.85**	**6.37**	**6.16**

TABLE 2.5

LOWER SECONDARY SCHOOLS
AVERAGE GOSS AREA IN M2 / STUDENT PLACE

GROUPING OF FACILITIES BY FUNCTION	12 CL.	16 CL.	20 CL.	20 CL.	24 CL.	28 CL.	32 CL.
POPULATION DENSITY	LOW DENSITY (RURAL)			HIGH DENSITY (URBAN)			
Teaching and pedag. support	5.70	5.33	4.71	6.26	5.42	4.95	5.13
Administration	0.68	0.52	0.45	0.48	0.44	0.40	0.38
Common services	0.67	0.63	0.62	0.89	0.87	0.87	0.86
Total including circulations	**7.05**	**6.49**	**5.77**	**7.63**	**6.73**	**6.22**	**6.36**

TABLE 2.6

UPPER SECONDARY SCHOOLS. STREAM DISTRIBUTION

GROUPING OF SUBJECTS	GROUPINGS	CYCLES					CLASSES				
TOTAL CYCLES		**7**	**8**	**9**	**10**	**11**	**7**	**8**	**9**	**10**	**11**
Languages	A	2	2	2	2	3	6	6	6	6	9
Social sciences	B	1	2	2	2	2	3	6	6	6	6
Mathematics and information	C	2	2	3	3	3	6	6	9	9	9
Natural sciences	D	2	2	2	3	3	6	6	6	9	9

TABLE 2.7

UPPER SECONDARY SCHOOLS
AVERAGE GOSS AREA IN M2 / STUDENT PLACE

Functional areas	21 Kl.	24 Kl.	27 Kl.	30 Kl.	33 Kl.
Teaching and pedagogical support	4.93	4.37	4.64	5.47	5.41
Administration	0.47	0.44	0.41	0.38	0.35
Ancillary facilities	0.95	0.93	0.92	0.89	0.89
Total including circulations	6.35	5.73	5.97	6.74	6.65

TABLE 2.8

■ PRIMARY EDUCATION

SITE MINIMUM SURFACE AREA BY STUDENT PLACE

(M^2 / student place)

School size	Population Density	Number of floors		
		GF	GF+1	GF+2
6 classes	Low	10.9	-	-
12 classes	Low	10.3	-	-
18 Classes	Low	10.9	-	-
18 classes	Low	-	8.3	-
24 classes	Low	9.9	-	-
24 classes	Low	-	7.7	-
18 classes	High	9.9	0.0	-
18 Classes	High	-	7.6	-
24 classes	High	-	7.5	-
30 classes	High	-	7.1	-
36 classes	High	-	6.4	-
36 classes	High	-	-	5.7

■ LOWER SECONDARY EDUCATION

SITE MINIMUM SURFACE AREA BY STUDENT PLACE

(M2/ student place)

School size	Population Density	NUMBER OF FLOORS		
		GF	GF+1	GF+2
12 classes	Low	16.2	-	-
16 classes	Low	14.7	11.4	-
20 classes	Low	11.4	9.3	8.2
20 classes	High	12.0	9.6	8.3
24 classes	High	10.7	8.5	7.4
28 classes	High	9.4	7.9	7.0
32 classes	High	9.5	8.0	7.0
36 classes	High			

TABLE 2.9

■ UPPER SECONDARY EDUCATION

SITE MINIMUM SURFACE AREA BY STUDENT PLACE

(M2 / student place)

School size	Population density	Number of floors		
		GF	GF+1	GF+2
21 classes	High	11.5	9.8	-
24 classes	High	10.6	8.9	7.9
27 classes	High	10.1	8.2	7.2
30 classes	High	9.3	7.5	6.5
33 classes	High	8.9	7.3	6.4

TABLE 3.5

2.3 ACCOMMODATION SCHEDULES (SPECIFICATION OF FACILITIES))

2.3.1 ELEMENTARY SCHOOLS - STANDARDS

The programming of the 12 standard schools for **pre-primary and primary levels** was carried out with the help of Excel tables giving standard accommodation schedules for schools of low density or rural areas (24 student per class) and for high density or urban areas (36 students per class). This table gives for each standard, the list of rooms by category, their quantities, the total net and gross areas and the average surface areas by student (annex 1-05).

2.3.2 LOWER AND UPPER SECONDARY SCHOOLS - STANDARDS

The programming of the 12 school standards for lower and upper secondary schools was based on a set of four excel tables linked to each others, starting from the

official weekly teaching loads and ending by the "accommodation schedules". These tables are:

(a) **The weekly teaching loads** for public schools by level, subject and grade (V1 annex 06).For upper secondary level, the table is divided in four different loads, one for each stream.

(b) The **curricula and time schedules**, allowing the calculation of total weekly number of hours by subject for each level and for each size of school;

(c) The **accommodation schedule** table, distributing the teaching hours by type of room and calculated the required number of rooms with their rate of occupancy; and

(d) The school accommodation schedule and **area tables** giving for each standard, the list of rooms by category, their quantities, the total net and gross areas and the average surface areas by student (V1 annexes 07 to 08).

2.3.3 BASIC EDUCATION SCHOOLS - STANDARDS FOR PRE-PRIMARY AND PRIMARY LEVELS

The programming of the 4 standard basic education schools was based on the accommodation schedules of both elementary schools and lower secondary schools. This programming was prepared on an Excel sheet (V1 annex 09) with the following distribution: (i) separated teaching and pedagogical support for each of the three levels of education; (ii) common facilities may be used by three levels such as administration, canteen, library, sports hall and other technical ancillary facilities (see paragraph 1.5.2 above).

2.4 FUNCTIONALITY AND FLEXIBILITY

2.4.1 FUNCTIONALITY

When designing a school, a certain balance should be established between quality of function and cost efficiency. This balance may be obtained by various means such as

(i) Rational **dimensioning** of spaces:

(ii) Adapted **circulation areas**: circulation spaces should not exceed 25% of the useful built area. They should be dimensioned and adapted to the school population, they should be functional and observe safety requirements;

(iii) Optimal **number of spaces**: the number of spaces is primarily determined by the rate of occupancy (see paragraph 2.2 above, on accommodation schedules). In small schools where an acceptable rate cannot be reached, especially for specialized teaching spaces, multipurpose spaces should be considered;

(iv) Maximum **versatility**: spaces must be designed with a maximum versatility, enabling them to adapt to several subjects and changes, when this is compatible with their functional requirements;

(v) **Grouping of spaces**: spaces should be grouped in blocks according to function and interrelation. This would ensure an easy identification of activities and their corresponding spaces, an easy communication between different spaces, without congestion in circulations and waiting areas, an easy surveillance of spaces and an optimal use of available land;

(vi) **Integration of needs**: the location of spaces within the school should follow fundamental imperatives such as sanitation and hygiene rules, functional comfort and security regulations as well as acoustic, visual and climatic comfort.

Example of a functional diagram for an upper secondary school (01)

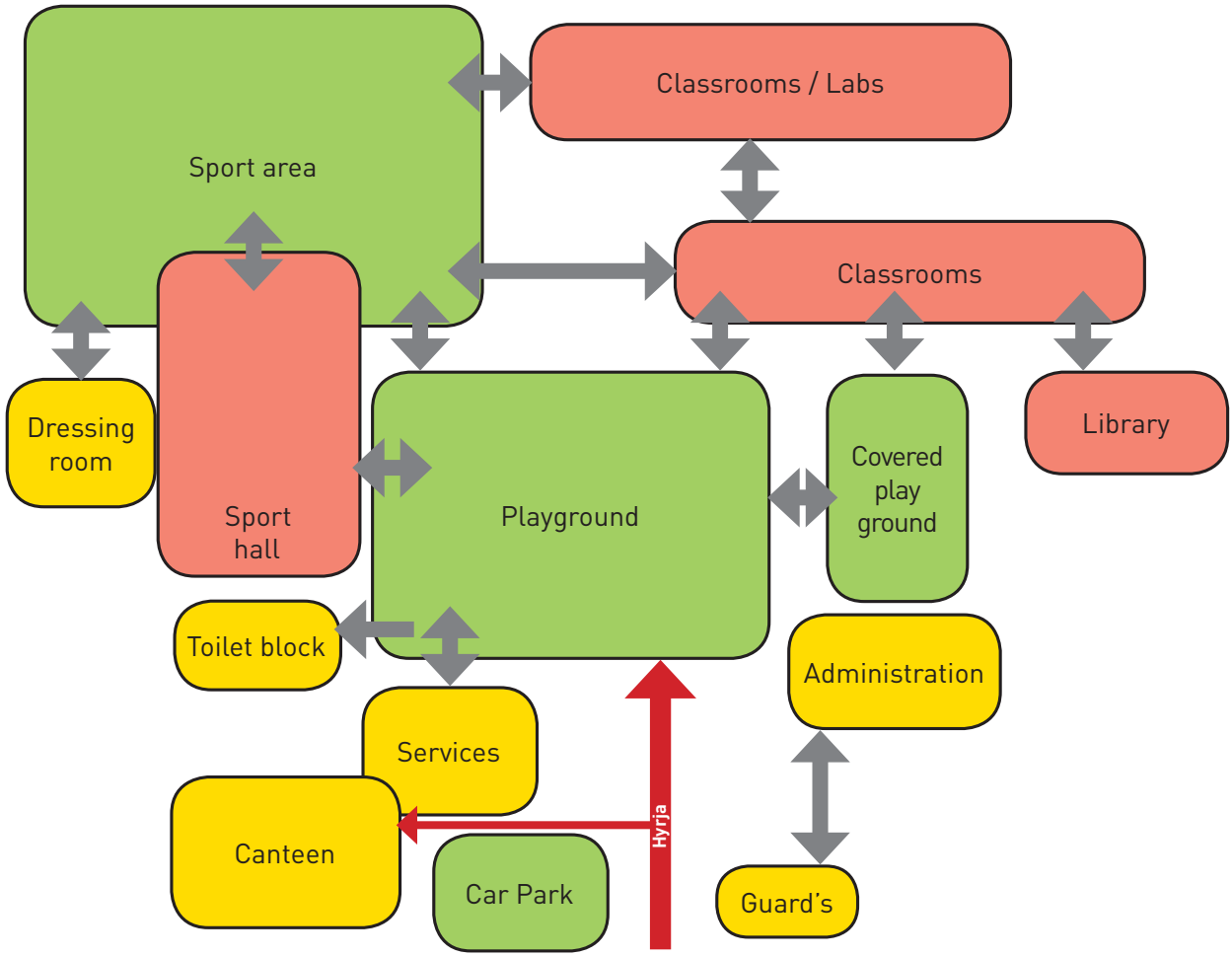


FIG. 1.2.6

2.4.2 FLEXIBILITY

The designer will have to foresee sufficient flexibility to allow (i) the school staff to adapt the school premises to various existing teaching methods; and (ii) planners to adapt the facilities to future eventual curricula and syllabuses:

a) The requested flexibility of facilities (and furniture) allowing for various teaching methods (see fig 1-2.8 below) concerns the ordinary classrooms (frontal teaching, working in small groups, seminar teaching...), laboratories and specialized rooms (practical work in half groups, demonstration courses in full groups) and multipurpose rooms and sport halls

Example of a functional diagram for an upper secondary school (02)

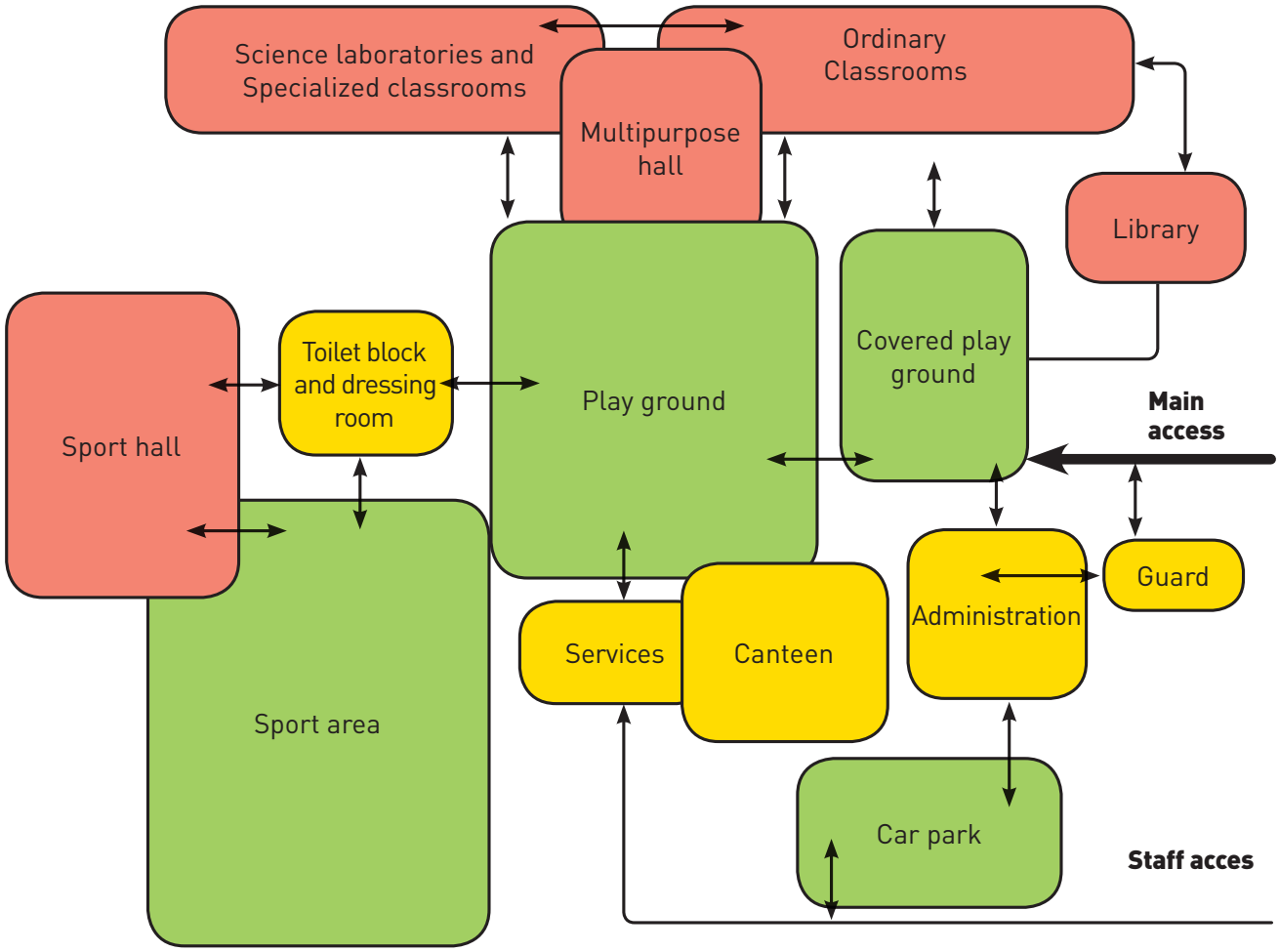


FIG. 1-2.7

(possibility to regroup several classes)...

b) The types and division of spaces given in the design program should be interpreted in structures that can be easily modified for changing needs in the future. Planning for flexibility is an essential consideration in school design to accommodate the continuous evolution in both educational thinking and building techniques and technologies. It will facilitate a school adaptation to new uses by means of changes in layout and permits such changes without excessive cost. For this reason, a flexible plan must also allow for an easy adaptation to future developments in space layouts, building structures, artificial lighting, ventilation techniques and acoustics. Making a buil-

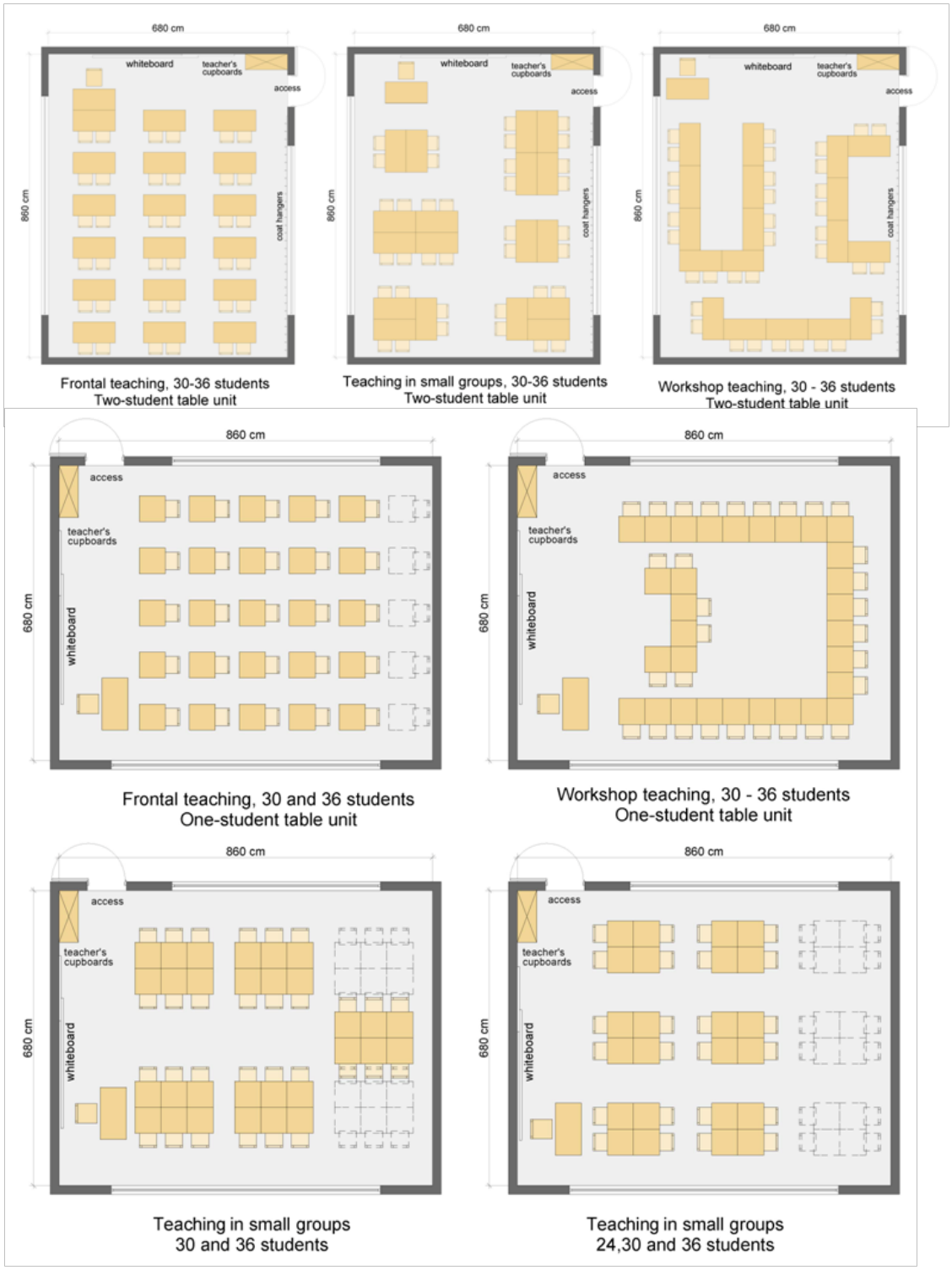

680 cm
whiteboard
teacher's cupboards
access
860 cm
coat hangers
Frontal teaching, 30-36 students
Two-student table unit
Teaching in small groups, 30-36 students
Two-student table unit
Workshop teaching, 30 - 36 students
Two-student table unit
860 cm
access
teacher's cupboards
680 cm
whiteboard
Frontal teaching, 30 and 36 students
One-student table unit
Workshop teaching, 30 - 36 students
One-student table unit
Teaching in small groups
30 and 36 students
Teaching in small groups
24,30 and 36 students

FIG.1-2.8

ding highly flexible (for example, with large numbers of moveable walls) is generally very expensive and can only be justified where the changes are likely to be frequent and essential. There is little point in putting in a large, sliding, soundproof partition if it is only going to be moved once a year. On the other hand, it is wise to avoid structural systems, such as having load-bearing cross walls between classrooms, which make it difficult and expensive to move walls and change room sizes at a later date. A timber, concrete or steel framed building will generally be much more adaptable in the future.

2.5 DESIGN AND AESTHETICS

The importance of the physical appearance of a public school should not be minimized. A school building that is attractive, responds to and is consistent with the design and context of the neighborhood, builds a sense of pride and ownership among students, teachers, and the community. Il addition, like most of the cultural establishments, the school is a symbol of knowledge and progress for the community.

The architectural quality of its buildings should therefore not only contribute to the functionality of the school, but also to its integration within the community and to its building as a symbol by:

(i) Instilling in students a sense of good architecture through the harmony and proportions of built spaces, open spaces, facades

(ii) Creating a pleasant environment in the school and helping users to appreciate it through the use of materials, colors and plants, the quality of waiting and circulation areas...etc.

(iii) Allowing an easy identification of different spaces by grouping them according to their activities and by providing easy links between buildings and spaces;

(iv) Integrating cultural values and specific elements of the community's environment and therefore increasing its sense of appropriation and its pride in its school;

The school internal spaces should reflect and enhance the learning activities by:

(v) Providing an interior environment that is visually comfortable and stimulating;

(vi) Providing ample natural light and incorporating colors that stimulate or soothe, depending on the space function;

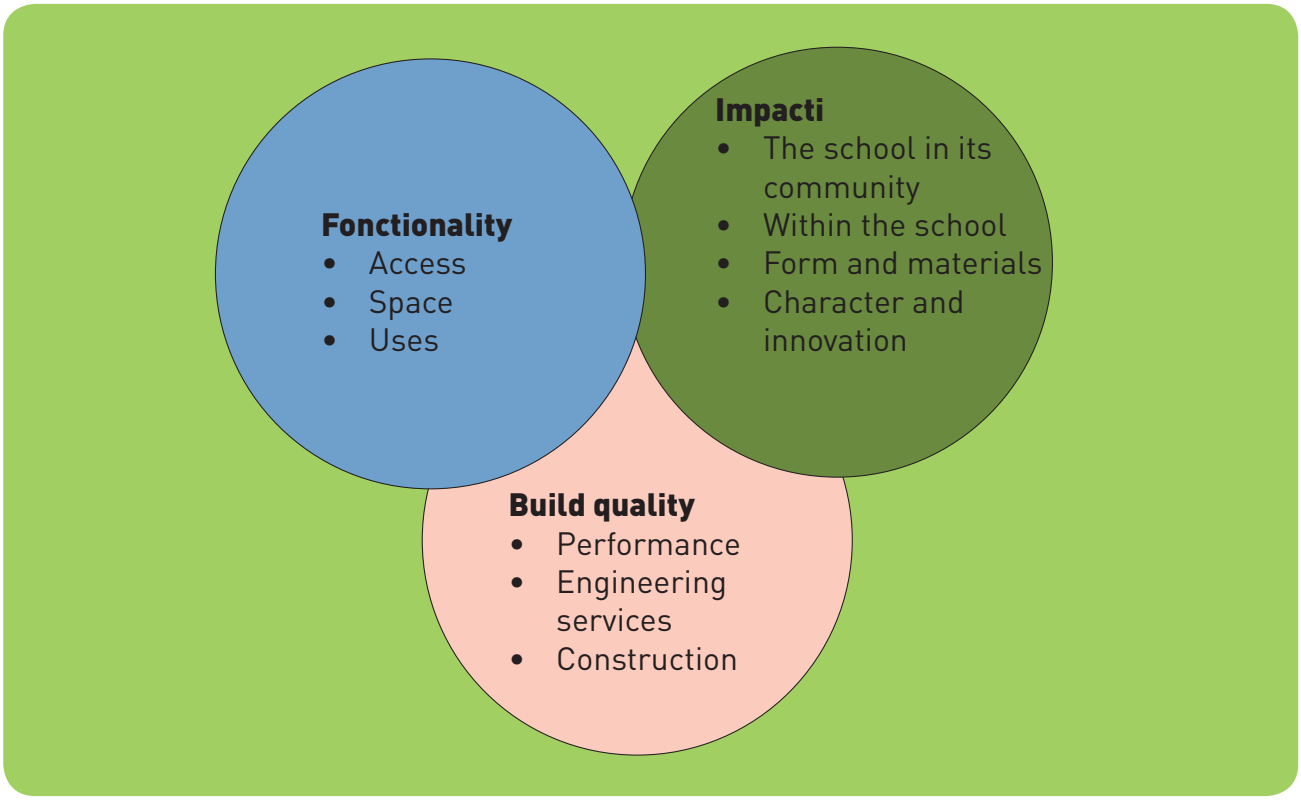
(vii) Ensuring diffuse, uniform daylight throughout classrooms and avoiding glare and direct-beam sunlight inside the rooms.

The quality of the Design should be discussed, specified, evaluated and checked at various stages throughout the design and procurement process. This will relate to things that can be scientifically measured, such as the level of daylight in a classroom, or to more subjective aspects such as the attractiveness of the building or how it makes users feel.

At the outset of the project there are many factors to be considered and many individual views to be taken into account for the quality evaluation and therefore, the client (Municipality and MEST/DI) may be willing to carry out a Design Quality Evaluation (DQE).

The Design Quality Evaluation (DQE) is a tool consisting of questionnaires with predefined statements distributed under three main headings: functionality, building quality and use. This tool is usually designed for use at three stages in the school building project: (i) Designer's briefing (to help prepare the architect's brief); (ii) Mid design (to evaluate the proposal against the original aspirations); and (iii) Occupation (evaluate how well the building is performing).

DESIGN QUALITY EVALUATION
Three indicators working together



2.6 COST AND BUDGET PARAMETERS

The materials and building techniques should ensure architectural quality while at the same time meeting budgetary requirements. The designer should therefore choose materials and techniques that establish the best possible relationship between quality, durability and cost.

The school capital and operating budgets are usually financed by different sources, their spending comes at different times and they are managed by different services and persons. As a result, there is often little incentive to factor in the long-term cost of a building when making decisions about its design and construction. However, to reduce the total cost of owning a building while ensuring its quality, it is necessary to balance the initial design and construction costs with the running costs such as lighting, heating, cooling, repairing and otherwise operating and maintaining the facility. This balance could be reached through:

i. Use of local resources (materials and labor) and consider the recyclability of materials within the threshold of quality;
ii. Ease and simplicity of design and construction;
iii. Durability with respect to the effects of climate and intensive use by students;
iv. Selection of building elements on the basis of

life-cycle cost analysis (compare the lifespan of projects and systems with the expected lifespan of the facility);

v. Specified materials and products that are easy to maintain;
vi. Commissioning of the facility to ensure that it operates in a manner consistent with design intent;
vii. Use energy simulation and analysis tools to optimize energy performance (integrate day lighting systems, high-performance HVAC, energy-efficient building shell, and high-performance electric lighting); and
viii. Anticipate and prepare an easy and efficient maintenance schedule with adapted materials and using locally available accessories and spare parts.

Once the project capital cost has been set up and its sum is broken down to give proportions for various elements, it is important for the Designer to immediately make a detailed cost plan based on a synthesis of the total gross floor area, using the total number required for each space category with the corresponding space allowances. To this, an allowance for circulation and structure will be added at approximately 25 % and the cost per m2 gross can then be calculated from the given budget sum. It should be noted that this addition for structure and circulation is generous and can be considered to contain a contingency. The target addition to be aimed at, in the final design, should be around 36%, which should include 12 to 14% for structure (difference between net and gross area).

A review and checking of unit costs on recent tender results will indicate whether the project space total is achievable within the budget or whether economies of scale or an increase in budget are indicated. Such a check is essential as a starting point for the design work. If there is a negative discrepancy of some size, then discussions need to be initiated with the Technical Department in charge of the project, as a matter of urgency. A report on the result of the budget check should be made in any case in the first progress report.