



## **Development of Exemplary Sustainable Models For A TECHNICAL SECONDARY SCHOOL**

### **1- Introduction**

The 25<sup>th</sup> of January has witnessed the beginning of a new era in which education is perhaps the most important challenge that Egypt has to face in order to become one of the leading nations in the 21<sup>st</sup> century. Education is responsible for developing human mentality, attitudes and skills.

In today's world which is characterized by unprecedented changes in the field of information technology, in building materials and technology, in mechanical and electrical engineering, in all kinds of industrial design...etc., there is a compelling need for schools that prepare and qualify technicians in all aspects of these fields of applied knowledge. These types of schools are noticeably lacking in Egypt except for few examples, besides ,they are socially and academically undermined.

### **2- Objective of the Project**

Our objective in this semester is twofold. First, to develop exemplary models for the design of this type of schools and to test these models in different urban and environmental contexts. Second, to change and upgrade their urban and social image. The school we design has to be sustainable, productive and interactive with the adjacent community. According to the Millennium Development Goals (MDG's) set by the International Community through the UN, sustainability is taken to be environmental, economical and socio-cultural. This means that the workshops of the school should also be productive and provide services to the community. Also, the socio-cultural components such as the multipurpose hall, activity spaces, and sports facilities, should be designed to be accessible and used by the community after school hours and during holidays.

### **3- Programmatic Issues & Components of the Project**

Technical schools accept students after finishing their primary and preparatory education (age group 15:18 years). It provides the same academic content as the standard secondary schools with an emphasis on both theoretical knowledge and practical skills together in the fields of, building materials and technology, mechanical and electrical installations, industrial design, fashion design and tailoring, furniture design and carpentry, weaving, photography ...etc.(students are asked to think of other fields of applied knowledge)

In addition to the administrative component and standard facilities of parking, reception, electrical and mechanical services, technical schools may be thought of as having 4 main components; three of which represent important organizational axes in developing the layout of the school, whilst the 4<sup>th</sup> component

deals with the boundaries between the domain of the school and that of the community. The 4 components and their organizational axes are as follows;

### **3.1 The Academic Component (Axis of Theoretical Knowledge)**

It provides the theoretical knowledge taught in class rooms and laboratories. It represents the main axis which links class rooms together with laboratories. It also comprises corridors and spaces (indoor/outdoor) for interaction between students. These interactive spaces are necessary to encourage dialogue and discussions, and to break the rigidity of the corridors. This axis is directly related to the north direction for light and ventilation. The number of classrooms determines the number and size of all other programmatic requirements such as laboratories, activity rooms, workshops ...etc.

According to Egyptian practice, there are 3 different sizes for secondary schools expressed in terms of the number of classrooms. These sizes are 13, 19, or 31 class rooms. However students are required to search for the standards specifically related to technical schools.

### **3.2 The Practical Knowledge Component (Axis of Technical Skills)**

It provides practical knowledge and skills acquired in the workshops. It also represents another axis of school design that has to be linked with the academic/theoretical axis on one hand, and with the community outside on the other hand to provide services and products. Workshops are to be provided with north light either from the side elevation or from the ceiling. Workshops, in any school, can either be specialized in one field of practical knowledge, or in a number of fields. The number and type of workshops are determined by the number of classrooms. As well as the compatibility relation between different types of workshops.

### **3.3 The Socio-Cultural Component (Axis of Socio-Cultural Knowledge)**

It provides socio-cultural knowledge acquired in activity spaces for music, arts, computer, cooking ...etc as well as sports facilities. It also comprises a library, a multipurpose hall and cafeteria. These activities are to be accessed from the inside of the school as well as the outside community after school hours and during holidays.

### **3.4 The School Boundary (Active Fence)**

It has a dual function; it provides boundaries for the school to control access from outside to non-communal activity spaces, and at the same time it connects the school and the society domains. The fence can comprise service workshops, exhibition areas and shops for students' products, bookshops ...etc.

## **4- Design Issues & Strategies**

Schools, like housing, are designed to be accommodated in different physical, environmental, and socio-cultural contexts. This requires a considerable range of flexibility in their design to be allocated in these variable contexts. This imposes the questions of what are the elementary components to be repeated?

What are the constituent parts of these repeated components, and on what basis are they chosen and connected together?

To answer these questions, the studio proposes the idea of a “generative pattern”

In general terms, schools have in their design a repetitive nature in which a number of related activities are repeated. The generative pattern is composed of the minimum number of related activity spaces that can maintain a particular sub-function in the school. The generative pattern has two important features;

1. Reflecting; the *Function*; needed by the programmatic-space design.
2. Resolving; the *Behavior* imposed by attitude and needs of users revealed from research.

For instance, a number of classrooms, served by toilets, together with a circulation corridor,( with interactive nodes) that links them together horizontally, and a staircase that links them vertically, can be considered as an elementary generative pattern that can maintain an act of academic teaching. The number of classrooms in this generative pattern is determined by standards regarding the minimum and maximum number of classrooms served by one corridor and one set of toilets and a standard staircase.

Having decided upon the activity spaces of the generative pattern, we may proceed to explore different spatial combinations of these spaces as well as different ways of repeating and allocating this pattern in the site. For instance, the generative pattern can take different configurations with respect to the north direction. Each of these configurations may also be repeated in many different ways, horizontally and vertically. From another perspective, the pattern may be extended to cater for other activity spaces such as labs, teachers’ rooms, activity halls, courtyards, even a workshop together with its work yard and service shop.

So thinking of school design in terms of repeated generative patterns has two advantages; first it facilitates the design by providing a practical and generative design methodology. Second, it provides a flexible and more innovative model that can respond to the site variables, its microclimate and its socio-cultural conditions.

## **5- Proposed Sites**

A number of sites reflecting different urban and socio-cultural contexts are proposed. Each student will select one of these sites or may propose a new site of not less than 12000 sq.m. Foot print should not exceed 30% of site area.

## **6- Student Tasks**

### **6.1 First Task; Research & Programming** (teamwork 2<sup>nd</sup>:4<sup>th</sup> week)

Our first task this semester is oriented towards research and programming. It is a teamwork exercise of not more than 5 students. It is composed of four main requirements as follows:

- A) To develop knowledge of the space standards and the spatial relation (zoning) of the different components of the technical school. The research should end up by a detailed program for a mid-size industrial school together with all the spatial, functional, environmental, structural and facilities required.(2<sup>nd</sup> week)
- B) Analysis and understanding of previous examples in Egypt, and most importantly, worldwide. (2<sup>nd</sup> week)
- C) Diagrammatic exploration of alternative generative patterns for each of the 4 components of theoretical, practical, and socio-cultural knowledge in addition to the active fence. (3<sup>rd</sup> week).
- D) Analysis of the proposed sites and contexts.( 4<sup>th</sup> week)

Each group will submit an A3 report documenting their work with respect to all 4 requirements. However, in terms of oral presentation each group will present either A or B or C or D. Knowledge exchange and discussion between groups are one of the prime objectives of this studio.

## **6.2 Second Task; Design Development** (individual work 6<sup>th</sup>: 14<sup>th</sup> week)

Based on the research output, each student will develop a detailed design of a “generative pattern” that includes either one or the two main components of theoretical knowledge (classrooms/toilets/circulation/interactive open & closed spaces/teachers’ rooms/labs...etc) and technical knowledge (workshops/work yards/service and selling shops and exhibitions related to the fence).

- The pattern should be flexible enough in its configuration to be combined with other patterns and repeated in sites of different sizes, shapes, and orientation. Alternative configurations for the same components are highly recommended. The pattern should also take into account all the functional, environmental and structural requirements.
- The pattern will then be tested in the site selected by the student, taking into account other socio-cultural and administrative components.

## **7- Deliverables**

- Site layout showing school composition, pedestrian and vehicular movement, playgrounds and parking spaces for buses and cars. (scale1/400)
- Plans, sections, elevations of the proposed school. (scale1/200)
- Plans, sections, elevations and details of the generative pattern and its alternative configuration. (Scale1/100&1/50)
- 3D shots interior & exterior.
- Physical model of one of the combinations of the generative pattern (scale1/200or1/100)
- Portfolio reporting the process of design from the abstract ideas to design proposal.

**Best wishes from all the staff members.**