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ABSTRACT

This publication is the second in a series of reports on educational buildings. This report deals with the multioption school, a special type of secondary school designed to offer a broad choice of educational options and activities in response to changing educational and social needs. The report analyzes problems raised by the design and construction of multioption schools and discusses the process of transforming theoretical models into practical buildings and equipment. The analysis emphasizes the need to base design projects and the briefing process on a study of the school's functions. In addition, the author examines ways to reconcile educational needs and various constraints through interdisciplinary cooperation, research and development, and teacher participation. Contained in the report are five case studies, which include plans, diagrams, and photographs of new school projects in Canada, Germany, Sweden, and the United Kingdom. (Author/JG)

OECD

PROGRAMME ON EDUCATIONAL BUILDING

BUILDING IMPLICATIONS OF THE MULTI-OPTION SCHOOL

BY JEAN ADER

ORGANISATION FOR ECONOMIC CO OPERATION AND DEVELOPMENT

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The main objectives of the Programme are:

- to facilitate the exchange of information and experience on aspects of educational building judged to be important by participating Member countries;
- to promote co-operation between such Member countries regarding the technical bases for improving the quality, speed and cost effectiveness of school construction.

The Programme functions within the Directorate for Social Affairs, Manpower and Education of the Organisation in accordance with the decisions of the Council of the Organisation, under the authority of the Secretary-General. It is directed by a Steering Committee of senior government officials, and financed by participating governments.

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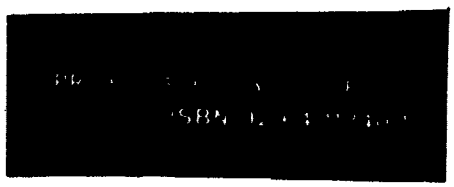

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Author's Note

In my capacity as Rapporteur of the present study, carried out within the framework of the OECD Programme on Educational Building, I wish to express my sincere thanks to a large number of people without whose contributions this report could not have been written. To the members of the team which took part in the investigation: Mrs. Birgit Rodhe, Deputy Director for Education for the Municipality of Malmö, Sweden; Mr. Michael Keyte, an English architect practicing in Paris; and Mr. Karl Hermann Koch, architect and responsible for a course on educational planning and school building at the Dortmund Teachers Training College, Germany. To Mr. Guy Oddie, Professor of Architecture at Edinburgh University and principal adviser to the Programme on Educational Building and finally, to the OECD Secretariat itself for its invaluable help and encouragement throughout the preparation of this report.

This study also greatly benefitted from generous assistance by the national, regional and local authorities in the countries concerned and the design teams, school principals, teachers and other staff, parents and pupils of the schools visited — too numerous to be cited in name here. I extend to them my collective thanks.

While it has not been possible to reflect all the views and contributions from these various sources, the merits of this study were nonetheless greatly enhanced by them. Final responsibility for the text, particularly its shortcomings, remains of course with the Rapporteur.

Jean Ader
Inspecteur d'Académie

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Preface

The present report has been produced as part of Activity 2 of the Programme on Educational Building (PEB) which was set up by the OECD Council at the request of a number of Member countries The purpose of the Programme is to facilitate the exchange of information and experience on aspects of educational building judged to be important by the participating countries and to promote international co-operation between them regarding the technical bases for improving the quality, speed and cost effectiveness of school construction.

The aim of the Activity was to study problems of facility provision for a new type of school, the multi-option school In order to maximise educational opportunity many countries are adopting policies of generalised secondary education in which each school offers pupils an increasingly wide range of choice in the subjects and courses studied The multiplicity of the options thus offered requires a corresponding increase in the diversity of the physical facilities and teaching expertise contained in the school and raises a number of new problems in the design of new buildings and in the adaptation and up-grading of existing stock.

The study thus dealt with one of the major themes underlying the activities undertaken under this Programme, namely that of the relationships between school building and educational innovation This is why an initial version of the text that follows served as a background document to the Symposium on School Building and Educational Change which was held in October 1973 at Buxton, England, and the final report which has just been published

The work on which the present text is based was conducted by a small pluridisciplinary team the members of which combined the skills of architects, educationists and administrators. Thanks to this diversity, in the course of the case studies undertaken on some selected schools in various Member countries and as a result of its discussions with design teams and with those responsible for school building at national level the team succeeded in delineating the main steps by which new types of facilities capable of meeting new teaching needs are defined. At the level of international exchanges, it seems that the clarification of design and construction processes yield more than the mere presentation of the solutions adopted.

Nonetheless, study of these processes has led to paying particular attention to certain specific design solutions and facilities. In point of fact one of the objectives of Activity 2 was to analyse newly built schools which through their innovative nature and inventiveness represent a fertile application of these design processes. From this point of view, the open areas and the modular furniture are important steps in the evolution of school building. But none of the examples quoted, nor any of the cases described should be considered as a model or an example bearing the recommendation or favour of the Programme on Educational Building Indeed, the purpose of a report of this nature is not to recommend or prescribe but rather to get people thinking about new types of school buildings. In this way, the report hopes to contribute to the development of research in this field It will only be meaningful if the ideas it outlines can be developed and lead to further work in greater depth in the countries themselves.

Summary

Definition of the Multi-Option School

To satisfy requirements linked to their economic and social development, most industrialised countries have created new educational formulae or types of school which display many common features The general term « multi-option school » applies in the present report to those formulae which concern the re-organisation of secondary education and in particular the last stage of compulsory schooling

In the countries under consideration, the multi-option school has two objectives

— to ensure the highest possible level of general education without attempting to assess vocational aptitudes prematurely and irrevocably,
— to reduce inequalities of opportunity while developing autónomous conduct and encouraging the emergence and expression of individual ability

The multi-option school is specific in its educational organisation in that it combines two fundamental features

— it offers all pupils a common education,
— it offers each pupil the possibility of choosing from a wide range of activities

This education of choice, essential to this type of school, leads to the organisation of options, this concept is to be understood in its broadest sense, since the choice may concern either fields of study (optional subjects, themes for an activity) or methods of work (roles and tasks, modes of expression and the material or technical aids for an activity)

Internal Tensions of the School and their Implications for Design

The design and construction of facilities (buildings and equipment) to meet the educational objectives of the multi-option school faces school building with unprecedented problems This is why it is becoming so important to study approaches and methods of work whereby educational models can be translated into the reality of space and equipment Indeed, it is no longer a matter of improving known types of school, but of calling their design into question in order to invent new educational tools and integrate them into sets of facilities of hitherto unattained complexity

These processes are generally thought of as a linear process making it possible to deduce the nature of the facilities from the educational model However, when the type of school is new, the continuity between the architectural proposals and the theoretical models so readily referred to is by no means a logical necessity and for instance, several different architectural solutions can be applied to the same set of educational principles The reason is that the functioning of a multi-option school is a complex reality that cannot be conceived simply as the projection of a model In actual practice, the principles underlying the multi-option school come into conflict and its functioning must be viewed as a set of educational tensions

For instance, at the concrete level of school life, there is tension between the objective of common education and that of freedom of choice The nature and layout of the accommodation, and in particular of specialised facilities, can govern these choices, broadening or narrowing them, and as it were predetermine the solution to be provided to the educational problem thus set

Facilities with a high degree of flexibility are conducive to the individualisation of education, however, they may at the same time represent an obstacle to the stability of the groups and to their appropriation of space, thus handicapping the development of social relations So here again, the nature of the facilities is a source of tension between two educational objectives

Disadvantaged or handicapped pupils call for both special attention and more thorough integration into the school community and these two ambitions are not easy to reconcile Is it possible to conceive facilities so that pupils in difficulty can be provided assistance without thereby cutting them off from their school mates ?

In order for the facilities effectively to meet educational objectives, models should be used embodying the tensions that are characteristic of the multi-option school In this way architectural proposals would not so much be answers to educational problems as projects for organising a framework within which the tensions inherent in educational reality can be made to co-exist, without masking them What is expected of a school is not that it solve conflicts but that it serve the lucid mastery of their evolution

The Problem of Briefing - a Key Concept: Activities

One of the essential stages in elaborating multi-option school projects, owing to their innovative nature, is briefing as defined in its broad sense

School building briefs have long been based on the organisation of education in divisions in which the class group is considered as the only basic unit This made for great monotony with respect to the size, the function and the potential use of the accommodation This is why this type of organisation is unsuited to multi-option school projects, where diversification of activities and groups is very much the rule

The briefing procedure based on departmentalisation takes as its point of departure the subjects taught and leads to defining the structure of the facilities by analogy with that of the curriculum It has been used for several multi-option school projects, but has led to disappointing results, by dividing the school into specialised « quarters », it reinforces the compartmentation of knowledge and makes it impossible to create conditions conducive to the development of inter-disciplinarity and social relations

The Concept of Activity

A more operational concept for briefing turns out to be that of activity, since each subject involves several types of activity, and some of these activities are common to several subjects Projects prepared with this concept as point of departure delineate much better the difficulties of inter-disciplinarity or the differentiation of the work, they lead to a wider variety of solutions

The concept of activity is not self-evident, to avoid cursory use and to make it an effective instrument for briefing, it must be subjected to a threefold analysis

— an observable activity in a new school, for example, is only meaningful when related first to the activities expected by those who conceived the project and second to the activities actually rendered possible by the facilities provided,
— even when described in behavioural terms, activities are meaningless unless related to school situations,
— the field of activities must be broadened beyond activities related solely to school

work namely those concerned with social life, recreation and leisure, and community use of facilities, logistic activities, and activities considered marginal but which must nonetheless be taken into account

Simulation

After completing the analysis of activities, simulation of the main situations in the life of the school projected should make it possible to draw up a typology of foreseeable activities Then, when proceeding with the detail briefing, models of educational procedure could then intervene, involving sequences of activities The teaching units introduced in certain *Gesamtschulen* in Germany are examples of such procedures derived from a model used to design certain facilities

Briefing should therefore allow not for activities but for sets of foreseeable activities defined in the light of the specific choices of the project, and it is to these sets of activities that the facilities as a whole must correspond.

Difficulties

In determining these sets of activities and facilities, certain difficulties are encountered namely

- the first is in deciding which activities are compatible and can therefore be organised within the same set of facilities, this is one of the problems raised by open areas which have shown that the threshold of compatibility of activities, linked in turn to the threshold of tolerance, can vary considerably depending on circumstances and on the users,
- a second problem stems from the conflict between specialised and general-purpose facilities of the areas available though it is by no means certain that it represents a real antinomy,
- the third and last problem relates to the internal composition of the sets of facilities and their inter-relationships, these in fact depend on interdependent decisions and should be studied simultaneously

Quantification

Quantification of facilities is more a point of arrival than one of departure in briefing, though the need for this quantification is a constant constraint, the effect of which may be positive, in particular on decisions and choices

The most operational unit for this quantification is the working place, the nature, area required and cost of which varies depending on the set and sub-sets concerned, and also with the possibilities of the designers to « negotiate » the constraints and even the norms

Quantification of a brief not only consists in determining the capacity of the facilities, but also of distributing the places amongst the different types of facilities according to the cost per type of place, the priorities and the thresholds below which one cannot go

The rigour which is implicit in the briefing and design process does not preclude a certain degree of indetermination in all multi-option school projects the practice of an education of options leads to a random factor in forecasting requirements, the allocation of the different spaces within the school must be capable of variation and it must also be possible to change teaching practices as time goes by

Research and Development

The work implied in the elaboration of multi-option school projects is a matter for collective research Indeed, certain procedures still widely used (an order placed with an architect, competitions), which presuppose a previously established brief as well as the separation of responsibilities, are poorly adapted to the study of such projects, maintaining as they do the intervention of the designers within a pre-defined framework which makes it impossible to arrive at school buildings satisfying radically new needs

Between the policy-makers who determine the general objectives of the educational system and, for instance, decide to introduce the multi-option school, and the agencies responsible for initiating and supervising the building projects themselves, many countries lack a mechanism responsible for translating the educational objectives into operational models so that the necessary facilities can be determined This gap cannot be bridged by mere regulations To promote the building of schools satisfying these new objectives, an intermediate body for research and development is needed.

The first problem is to decide whether the action of this body should be based primarily on imperical observation and testing of new solutions, or whether it should concentrate more on fundamental research Whatever the case, such a body requires continuity and a fairly broad field of action Its work represents a continuous effort drawing up of projects on the basis of analyses of actual situations, evaluation of projects, feedback of lessons learnt into new projects and wide distribution of the results of this work

Thanks to this distribution, the research and development body can help to set up new structures of dialogue and foster the creation of design groups These groups enable the barriers to be broken down between those who prepare the educational models and those whose task it is to interpret them, as well as between the latter and the users The groups are often composite (educationists, architects, administrators, teachers, parents and pupils) and therefore experience problems of communication and language The most fruitful level of intervention for their work is regional, even where the action takes place at local level and flows from guidelines imparted at national level.

In their attempt to innovate they are often confronted with constraints that cannot be eluded, but towards which they should be able to develop new attitudes This concerns particularly norms and cost limits These are not purely negative and can in fact stimulate the work by imposing choices; they also make for a certain fairness in the distribution of resources However, their relative weight differs according to the way in which they are administered or regulated In order to draw up projects for multi-option schools, the system of ceiling of expenditure most commonly adopted is that which uses the « cost place » as unit of account; this system leaves the design groups free to decide how to deploy the resources allocated to the project as a whole.

The problem of whether innovation in school building involves additional costs remains still very much in dispute Experience of various countries differs widely and the conditions of innovation likewise differ Compliance with cost limits makes innovation more credible, though it is by no means certain that additional costs are invariably unjustified The levels at which cost limits are set is always the outcome of a political equilibrium between the pressure of needs and the availability of resources

Part one:

GENERAL PURPOSE OF THE STUDY

I. Hypotheses: three guiding ideas

A. To Identify the Common Problems

1 In a number of countries the main preoccupations in the field of school building have evolved along comparable lines. For a long time, the needs arising out of reconstruction, urban growth, population pressures and migration, and the spread of schooling to a wider age range and greater numbers meant that the emphasis was essentially a quantitative one. More recently — within little more than the last ten years for some countries and much less than that for others — the emphasis has shifted to problems of quality Some countries have been encouraged by the magnitude of their programmes to concern themselves with improving the effectiveness of the solutions proposed; in other countries, the obsession with numbers, having become less pressing, has given way to a greater reflection on the nature of the facilities to be provided. Thus, both educationists and those responsible for school building have become conscious of a fact which had long been neglected, there is a close, and sometimes decisive, relationship in school buildings between the layout of the accommodation and the type of education provided in it The result is that a school building policy must nowadays pay greater attention than in the past to the question of what kind of facilities should be provided in order to develop the education which a society chooses for itself.

2 In the various situations in which this question is being tackled in concrete form, it is all the harder to arrive at satisfactory solutions, the more innovatory the type of education provided and the more elaborate its objectives This is very evident wherever the types of school that are currently known as comprehensive or multi-option are developed While they differ according to country and according to the date at which they first emerged, all these schools have a common approach to education: to give all the young access to a common culture, and at the same time, to differentiate the activities of the school in the light of their aptitudes and interests The design and construction of suitable buildings for this new type of school have greatly stimulated — often with success — the creative imagination, but at the same time have posed a number of problems without always solving them, and have revealed numerous obstacles which are difficult to overcome In a good many countries, moreover, the development of this type of school and the provision of the corresponding facilities are still embryonic and sometimes confined to promising but scanty experiments. It is for this reason that there is a strong international demand for information and exchange of experience on the design and provision of suitable facilities for the multi-option school.

3. Clearly, it cannot be the purpose of the present report to define the characteristics of the facilities (i.e. of the buildings and their equipment) which would constitute the best instrument for the multi-option school. Nor is it intended to make a catalogue of possible answers to the question already referred to namely, what kind of facilities to provide ? Experience has clearly proved that the solutions worked out in certain countries or certain regions cannot be directly transposed to others. It has also shown that when such a transposition has been attempted, it has not done away with the need for trial and error and for studies, finally, it has shown us that those responsible for school building hardly want to be told what solutions or what models to adopt or substitute for their own, but that they want to be helped in working out or improving their own solutions and their own models

4 This report is therefore based on the hypothesis which seemed the most promising for the development of international exchanges in this field, namely that there are certain problems which are common to all those who, in various countries, design and provide the facilities needed by the new type of school. But these common problems are not always easy to identify. Far from it, they are often masked by circumstantial problems which demand urgent action, or by the constraints of finance or regulations specific to each country; sometimes a solution which is no longer challenged may itself be an obstacle to tackling fundamental problems. One of the first tasks will therefore be to identify the common problems brought to light by the various experiences encountered.

B. To Set School Building in a Context of Change

5 If the role and conditions of education are to change radically with time, the facilities provided for it must be adaptable to that change. No one formula for education (or given type of school such as the multi-option school) can be regarded as definitive At the most, it can be said that it provides the most satisfactory answer to the educational needs of today's society It must therefore be considered and studied in a context of change In this sense, the multi-option school is a moment, a phase in the process of innovation, and can only be understood by analysing the changes it brings about

6. The buildings designed and constructed for this type of school must be looked at from two viewpoints. On the one hand, they are the fruit of a major effort of innovation; to imagine new spaces and to create new facilities means

a break with old structures, but it also means challenging norms and customs which have adapted to these structures or been generated by them, and questioning constraints On the other hand, these new facilities must adapt to future change and must favour innovation in this sense the multi-option school must not, by becoming frozen into a formula, counteract and sterilise the movement which gave it birth

7 Thus, the second hypothesis, or guiding idea, of the present report is linked to the fact that the present time must be regarded as a period of transition in most countries, the multi-option school is still far from general, where it is most highly developed, it is only by successive approximations that it has sought to define the facilities it needs In this hypothesis, the problems raised by built or planned facilities appropriate to the multi-option school have the common characteristic of being problems of change In other words, these problems raise or are related to three types of question

a) Every solution, every answer to a problem of provision of facilities, is a challenge to an earlier solution or to an earlier order of things; it therefore refers back to the question of how such a challenge is, or has been, possible, since new solutions encounter resistance of all kinds
b) Next, since a great many factors intervene in the running of a school, every new experience involves risks of distortion, since it is difficult to modify all these factors simultaneously. Thus, for example, the changes in the buildings and those which can be observed in the behaviour of their users occur at a very different pace, with the result that the planned use and the actual use of facilities do not coincide One is therefore always brought back to the question of how to avoid, minimise or overcome the distortions when changes are introduced in the design and layout of school buildings
c) Finally, beyond the standard question of « how to provide facilities suitable to the educational objectives of the multi-option school » we find another more complex question how to ensure that these facilities allow multiple answers to the needs of modern education and that they encourage the invention of new activities and behaviour not strictly foreseeable at the time of their design ?

C. To Analyse the Approaches to the Briefing and Design of Projects

8 Solving the problems of school buildings, or as stated above, the provision of facilities, means establishing a set of relations between school life as it seems desirable and possible today and the organisation of its material setting The multi-option school can be taken to represent a concept of school life the characteristics of which will be considered more fully below It is this concept which, in principle, governs the organisation, layout and equipment of the spaces needed How can this matching be arrived at ?

9 Since the multi-option school represents a break with the structure of the predominant school system, the facilities it needs cannot be defined by simple improvements or revisions of the current types of school buildings with a view to adapting them to new needs On the contrary, where there have been significant achievements in building for this type of school, we find that there has been considerable preliminary work in defining on new bases the function and the structure of these facilities: from our point of view, this preliminary work is just as important as the results to which it leads That is the third hypothesis or guiding idea of the present report. In this hypothesis, there are several reasons for the importance of this work First of all, it brings to light the major problems raised by the design and provision of suitable facilities for the multi-option school, it is therefore a particularly useful field for the study of the common problems referred to above Secondly, the school building projects of the type with which we are concerned are usually of some complexity, and this complexity is increased by their novelty Therefore they cannot generally be assigned to a single specialist but call for team work among a number of different specialists with differing responsibilities. This confrontation of different points of view and the exchanges which it implies quite obviously afford favourable conditions for elucidating the problems we have to identify

10. Finally, the value of the approaches which we propose to explore stems from their non-linear character It is too common an illusion that one can pass from educational concepts to the definition of the projects which give them life by a simple process of deduction Many of the documents presenting the development and construction of multi-option schools seem to suggest an unbroken continuity between an educational concept or model on the one hand and a building project on the other But these documents are very often drafted after the event, when one can assume the problems have been solved and their purpose is to justify the solutions adopted rather than to analyse the difficulties encountered in arriving at them. Now, things are not as simple as that, it is easily learned from experience that the same model of functioning developed for multi-option schools of the same region results in different buildings with distinct architectural features More fundamentally, it will be noted that educational models can never be the subject of a simple description in which their elements are juxtaposed in linear or static order On the contrary, there are tensions, not to say conflicts, between these different elements, which one must not try to mask but which must be dealt with as such For example, the multi-option school aims at giving all its pupils access to a common culture and at the same time developing their possibilities of choice, it must therefore offer them both a common core of knowledge and the widest possible range of options. But, in the actual organisation of a school, these two aims seem if not contradictory at least difficult to reconcile Similarly, this type of school tends to develop the individualisation of education, which at the practical level of school life is bound to conflict with the development of social life, this being another of its objectives

11 These tensions can certainly not be resolved by compromise or middle-of-the-road solutions The responses invented by experience certainly do not eliminate them, these responses are therefore always provisional and shifting The architectural implications of these educational tensions take specific forms, but without exactly reflecting the tensions; this simply means that there is no one-for-one correspondence between the educational tensions and the tensions created at the level of the facilities provided for the multi-option school — for example between general purpose facilities and their appropriateness to specific activities. It is the relations between these two different kinds of tension which afford the richest aspects of the problems of what we have called the provision of suitable facilities for the multi-option school

II. Definitions: characteristics of the multi-option school

A. Its Situation in the Evolution of School Systems

12. The multi-option school must be regarded neither as an educational system in itself nor as a strictly defined type of school. Nor is it an ideal concept which is to be used in the evaluation of new schools If the use of this general

term is justified, it is because it refers to the converging transformations which can be noted in the recent evolution of the educational systems of the industrialised countries In these various countries such transformations, whose magnitude and style differ widely from one country to another, are the response to common concerns, and the designation multi-option school is one of the key-terms of a common language which makes it possible to relate these transformations to one another and to detect a certain coherence between them

13 In the industrialised countries generalised primary education is already long established, whereas generalised secondary education, linked with the prolongation of compulsory schooling, is much more recent Contrary to what happened in primary education, this extension was achieved by the successive addition of new types of school to the old traditional types of secondary schools Modern Schools and Grammar Schools in Great Britain, *Hauptschulen* and *Realschulen* alongside the *Gymnasium* in Germany, complementary courses and modern colleges added to the *Lycées* in France, etc. In this way vertical streams relatively separated from one another resulted in the distribution of children leaving primary school into parallel routes with different contents This distribution, the methods of which have evolved, and which vary in different countries, results in a selection which is premature and, in fact if not in law, final and irreversible; each stream represents an orientation from childhood towards a predetermined type of studies and type of career

14. It is this educational system to which the multi-option school offers an alternative. The school with options has a long tradition for example at secondary level, High School, in the United States or in Europe at higher secondary level, the Swedish *Gymnasium* or the Sixth Form in English schools. But the multi-option school formulas designed for lower secondary or intermediate education (generally age 11 to age 14 or 15) are, on the contrary, much more recent. A few examples can be cited: the higher level of the Swedish Basic School (7th, 8th and 9th years), the English Comprehensive School or the German *Gesamtschule*, or the small number of *Collèges* with ability setting to be found in France. In Sweden this formula has been generalised throughout the country by central government decision since 1962, thus changing the educational system; in France, on the other hand, these schools are still only experimental and few in number; between these two extremes, the status of the multi-option school varies widely between regions and between countries.

B. Social Objectives

15 In spite of the great diversity of situations and the various types of multi-option schools, their appearance and development respond to needs which are largely comparable everywhere. The underlying reasons for the development of this innovation can be grouped in three main categories:

a) Socio-economic needs: The evolution of modern societies demands from more and more young people a constantly higher level of general education; this is one aspect of the full utilisation of human resources. The pace of technological development also calls for a degree of [illegible] mobility which makes it [illegible] predict the educatio[illegible] by rapidly evolving skills. [illegible] meet the needs of a flexible economy, the new forms of education therefore seek to postpone as late as possible the age at which selection becomes irreversible and to eliminate the planned restrictions of an elitist education.

b) Needs arising from social demand: Today social justice no longer infers equality of access to education but equality of opportunity within the educational system for all young people, whatever their background. To achieve this new form of democratisation, the school is expected.
   - to reduce, through its organisation, the incidence of discrimination between children from different social groups;
   - to enable young people from different social backgrounds to share a common experience;
   - not to treat all children alike, since that enhances the cultural advantage of those who come from privileged circles, but, on the contrary, to offer each child the methods, pace and forms of education which suit it;
   - to guard against failure by guidance in providing teaching for the support and compensation of the less favoured children;
   - to develop free and responsible conduct, especially by allowing children gradually to take charge of their own education and therefore to choose their fields of study, the organisation of their work and the means of doing it, and, more generally, to combine individual development with genuine social education.

c) Needs of a psychological nature: The school is expected to encourage the greatest possible fulfilment of each individual. Differences of aptitude should therefore not be used to justify premature specialisation, but should rather be taken into account in differentiating the process of learning. This differentiation is further justified by the fact that there is no such thing as a general aptitude by which children can be classified into different graded streams of study; the learning processes must therefore be differentiated within a common education. Finally, the importance of motivation in studies leads to the organisation of diversified activities which disclose aptitudes rather than presupposing them, which are based on the expression of interests and tastes and which develop the participation of pupils in their own education Effective education should not be something which is passively submitted to, but should involve the freedom and responsibility of the pupil It thus involves an education of choice.

C. The Dual Character of the Multi-Option Schools

16. The term « multi-option school » will be used to designate all forms of secondary or intermediate education which combine both the following characteristics:

a) They group together in similar schools all young people in the relevant age groups (generally 11-12 to 14-15). They offer them all the same curriculum without specialisations or specific orientations and they emphasise the development of social relations between these pupils
b) Their educational organisation is designed to allow each pupil a certain freedom of choice both in the content of education (subjects and areas of study) and in his working methods and the means employed.

17 It is important to stress that it is the combination of these two characteristics which gives these formulae their character of innovation. As already mentioned, non-comprehensive option schools have been known for a long time and do not meet the needs described above. Thus, for example, the system of options typical of the American or Canadian High Schools does not satisfy the above definition. This system operates only in favour of a pre-selected population within an education reserved for a minori[illegible] the problems it deals with are not comparable to those of a comprehensive multi-option school which seeks to develop a form of education common to all children. Furthermore, the framework within which this system operates evaluates the different choices in the light of the openings afforded by the different combinations of options chosen, some combinations, for example, qualify for university entrance; others do

not The result is that, in spite of its great flexibility, this system ultimately reinforces the selective character of this education. In the absence of a comprehensive education common to all, a system of options may become self-contradictory

18 Conversely, it can be said that a system of comprehensive education implies the provision of options and possibilities of free choice The corollary of ing common education for all children provide a diversity of ways and or its assimilation in view of the diversity of aptitudes and interests This differentiation of the common education includes developing the possibility of the individual choosing his own path of learning In the words of the Swedish *Laroplan* for the Basic School *(Grundskola)*, « The principle of free choice is a cornerstone of the comprehensive school » (1)

D. A Wider Concept of Options

19 The word « option » in the term « multi-option school » must be interpreted very widely Among its possible meanings the main stress will be laid on the following:

a) **Options as a choice of subjects offered to the pupil.** This is the traditional meaning of the word The range of options is specified in the curriculum, together with the number of possible choices and the time spent on the option chosen For example, in the Swedish *Grundskola*, during his last three years the pupil must choose one of four optional subjects — a foreign language, technology, economics or art — on which he will spend three or four hours a week What are sometimes called « alternative courses », where there is a choice between a normal level, an advanced level and a « support » level, fall into this category of options. The pupils' aptitudes and their consciousness of them seem to influence their choice of this type of option more than their interests and tastes.

b) **Options as a choice of specific areas within a general subject.** In subjects such as foreign languages, often compulsory, a choice is generally offered between a number of languages. This is a familiar arrangement with nothing novel about it The multi-option school often affords interesting extensions and improvements This is found, for example, in the organisation of subjects such as arts, home economics or domestic science. In arts for example, the students will be allowed, within the alloted time, to split up into different « ateliers », such as drawing, painting, engraving, modelling and sculpture, ceramics or silk-screen printing Provided these are interconnected, as they generally are, they never lead to narrow specialisation. The pupils' choice mainly depends on their special interests and skills.

c) **Options as the choice of an activity the nature and content of which are negotiated (2) between teachers and pupils.** For example, in a number of colleges in Touraine (France) « ateliers » are organised which offer the pupils a very wide range of fields (from drawing to applied mathematics, or from scientific experiments to pottery). The pupils split up according to their own tastes and depending on the places available. The nature of the activities is determined both by the interests and tastes of the pupils and by proposals made by the teacher in the light of their own skills (which, moreover, often go beyond their academic subjects) and of the facilities available in the school. The time spent on these optional activities is defined by the curriculum and organisation of the school. It obviously varies widely. In the Touraine colleges it amounts to about nine hours a week In the Swedish schools (7th, 8th and 9th years) two

TABLE 1

Periods Allocated per Week per Subject in the Swedish Basic School (terminal level)

(1 unit = 1 period of 40 minutes)

	Subjects	Number of periods					
		7th year		8th year		9th year	
		Pupils	Teachers	Pupils	Teachers	Pupils	Teachers
I	**Compulsory subjects**						
	Swedish	3	4	3	4	4	5
	Typing	—	—	—	—	—	1
	Mathematics	4	4	4	4	4	4
	English	3	3	3	3	3	3
	Music	2	2	—	—	1	1
	Drawing	2	2	2	2	1	1
	Handicrafts	2	2	2	2	1	1
	Domestic Science	—	—	3	3	2	2
	Physical instruction	3	3	3	3	3	3
II	**Orientation subjects**						
	Religion Civics Geography History Natural Sciences Chemistry Physics	10	13	10	13	10	13
III	**Optional subjects** (French, German, Economics Arts and Technology)	4	4	3	3	4	4
IV	**Freely chosen work**	2	—	2	—	2	—
	TOTAL	35	—	35	—	35	—

Source: Curriculum for the Comprehensive School. Lgr 69. General Section. National Swedish Board of Education. Stockholm, 1971, pages 6, 118

Notes:
— The system of options intervenes at three levels (II, III, IV), at level II 'Orientation subjects', the globalisation of the periods allocated makes it possible to orientate the pupils within the framework of pluridisciplinary activities, towards a variety of activities appropriate to their interests and abilities
— The difference between the number of periods for the teachers and for the pupils results in "resource" or spare hours, the purpose of which is to permit diversification of teaching procedures (doubling of the teaching staff for a group, team teaching, work in small groups, etc.)
— In the 9th year, each pupil spends a fortnight as a trainee in a real life working environment

1) Curriculum for the Comprehensive Schools Lgr 69, General Section, Skolöverstyrelsen Stockholm 1971, page 6

2) In other words, the pupils' activities are no longer determined by the teachers alone (or by the curriculum they have to follow but by the teachers and pupils together)

TABLE 2

Framework for the Organisation of Activities in "ateliers"
Collège d'Enseignement général, Sainte-Maure-de-Touraine, France

Number of groups by field for each working day of the week

	Monday		Tuesday		Wednesday		Friday
* Archeology	1	1	—	—	—	—	—
* Workshop practice	1	1	—	—	1	1	—
Sewing and needlework	1	1	1	1	1	2	2
Cooking	1	1	1	1	—	—	—
Drawing	1	1	—	—	3	1	1
* Documentation	1	1	1	1	1	1	—
French	1	1	2	—	2	2	2
History/Geography	—	—	—	1	2	1	2
* Printing	—	1	—	—	—	2	1
Foreign languages	5	2	2	4	4	1	3
Mathematics	2	—	2	2	2	1	2
* Photography	1	1	1	1	—	—	1
* Pottery	1	1	1	1	1	1	—
Science	1	1	1	1	—	—	1
* Tapestry	—	—	1	1	—	1	1
* Drama and poetry	—	1	1	—	—	2	1
Manual work	—	1	1	1	1	1	1
TOTAL	18	16	16	15	18	17	19

Source: Internal document of the school, May, 1972

Note: — The "ateliers" are organised every afternoon, with two sessions per day (except Friday), i.e. seven sessions or periods per week. Every fortnight each pupil has to choose a new "atelier". The aim of the teachers is to have each pupil participate in a wide variety of "ateliers" in the course of the school year.

While the organisation of numerous "ateliers" taking place at the same time offers a wide range of choice, it raises problems of space. There were no suitable facilities in the school for the activities marked *, and these were organised thanks to improvised arrangements made possible through the initiative of the teachers.

hours a week are spent on « freely chosen work » in addition to four hours of optional subjects proper.

d) **Options as a choice of themes within a field of study defined in the curriculum.** In certain subjects specified in the curriculum, the same question may be dealt with from different points of view or on the basis of different themes. This is particularly true of inter-disciplinary studies (sometimes called integrated subjects) where the disciplines do not impose the rigour of their own logic. Thus, in a particular school one may find a group of classes working for several weeks on the same field of study — say the United States of America. After a few joint introductory sessions, the pupils split up into groups according to their interests, each group exploring a different theme within the field of study — the racial problem, the conquest of the West or the big American cities. These themes may be proposed either by the teachers or by the pupils. Their choice is largely independent of ability and is based mainly on the interests of the pupils.

e) **Options as a choice within a method of teaching.** This category may cover several kinds of choice open to pupils in the course of their school activities. In the type of work described under (d) above, the distribution of pupils by roles or tasks may depend on their own free choice. In the research or exploratory stage of the study of a theme, some may choose to work from documents, while others may prefer to carry out a small investigation. In many areas involving expression (mother tongue, foreign languages, the study of a theme in connection with « integrated subjects » history, geography, etc.) it is common to leave each pupil free to choose his mode of expression or the type of work he undertakes to prepare from a range of possibilities presented or suggested to him. Finally, under a more elaborate, but less widespread practice, teaching makes use of a number of documents and aids (printed or not) which make it possible to change the role of the teacher and to develop the pupil's independent work. The use of these aids is not necessarily uniformly programmed and it is possible for the pupil to choose out of an available set the one which he will use at any given moment.

20. It will thus be seen that a system of options is always linked with freedom of choice. This choice is more or less open, and this freedom more or less real, according to the availability of the alternatives offered. One problem will therefore be to ascertain the resources which give concrete form to these possibilities — teachers, accommodation, equipment, what should be their quantity and nature; how far should their necessary diversification be carried if the risk of their underemployment increases proportionately to their diversification ? Another major problem is how far all the possibilities can or should be predetermined. In general it is the educational system or the teachers or the resources available to the school itself that determine the possible range of choice. But can the pupils (or their families) ask to go beyond this range ? If the school organisation allows it, are the resources adequate for this extension ? Or are the possibilities of choice irrevocably determined by the facilities available to the school ?

21. Finally, the choices are by definition random and unpredictable. The distribution of pupils by activity chosen is therefore likely to vary every time a new choice has to be made [it will be noted that new choices are more frequent in type (c), (d) and (e) options than in types (a) or (b)]. Must we accept the fact that the available resources limit these variations and therefore restrain the freedom of choice or must we adjust the available resources and give them a flexibility which allows the widest possible freedom of choice, and if so, how ?

Part two:

THE FUNCTIONING OF THE MULTI-OPTION SCHOOL

22 In the first analysis, it can be said that the most appropriate facilities for the multi-option school are those which enable it or encourage it to function as closely as possible in line with the expectations arising out of the needs defined in Part One and the corresponding general objectives It is therefore quite understandable that, in nearly all projects, the design of these facilities is accompanied by an effort or attempt, first, to clarify, formulate and even formalise these objectives, and, secondly, to ensure that the architectural proposals put forward are consistent with the objectives they are intented to meet.

23. This work of alignment makes use of intellectual tools called models, the main purpose of which is to link the conceptual aspect with the operational aspect in the development of a project. A model is a simplified scheme or image giving an advance representation of what is expected of a school of the relevant type, for our purposes the multi-option school. The object of Part Two is therefore to explain how these models enter into the preliminary work, and then to define what might be an appropriate model for the provision of facilities for the multi-option school

I. General aspects of the use of models

24. It is a truism to say that every school building project refers to models, and particularly to an educational model The fact that these models are conscious or unconscious, explicit or tacit, is independent of their real role and of the reality of their occurrence. From this point of view school building projects and their implementation do not differ between the traditional type of schools and multi-option schools. But the positive contribution which the construction of multi-option schools has made to the methodology of school building is that their innovatory character necessitates the elucidation of their reference model.

25. In many countries the instructions given to architects for the construction of the current type of schools, resulting from official texts and norms in force, consist essentially of schedules of accommodation accompanied by a few comments and technical specifications. The underlying assumption is that the dominant educational model from which these prescriptions proceed is the subject of consensus and that its implications for building are therefore immediately clear to those who have to carry out the projects Communication between « sponsors » (educationists, administrators) and « designers » (architects) is then based on reference, often implicit, to an educational system and a cultural background common to both parties and therefore immune from any challenge.

26. When it comes to designing facilities for the multi-option school, it is no longer possible to proceed on such assumptions and it is therefore necessary to elucidate the new models. This explicit reference then plays a twofold role. Inside the design team it makes it possible to establish communication, which ensures that all the members of the team have the same understanding of the aims of the project, since an intuitive knowledge of these aims is always insufficient in the case of an educational innovation. For people outside the team (authorities, other teams, educationists, the general public) this reference also serves to justify the project and make it acceptable, especially by clarifying the reasons for a new use of available resources.

27. Models are not always presented as such. SAMSKAP (the organisation for school building cooperation between local authorities in the Malmö region Sweden) uses theoretical models which are then translated into briefs and plans for particular schools. On the other hand, neither the term nor the idea are ever used by those responsible for SEF (Study of Educational Facilities, the school building design and planning agency of an industrialised system in Metropolitan Toronto, Canada) and do not appear in the documents. But, in the first place, the striking similarity of the different schools built and, secondly, the systematic and highly structured character of the manuals published by that agency (1) disclose a clear intention to link the architectural proposals as closely as possible to a conception of the school. The « Building Bulletins » issued by the Department of Education and Science of England and Wales make little explicit use of the idea of a model, but in the Bulletins numerous references to the concept of the school are introduced to support the description of the architectural projects covered. In contrast, the documents issued in connection with the construction of the new German *Gesamtschulen* make more frequent reference to the idea of a model (2). It can therefore be said that all the design teams encountered in the course of this study refer to an alignment of the aims and principles of the new type of school with the design of the facilities provided.

1) The manual corresponding to the multi-option school as we have defined it is entitled **Educational Specifications and User Requirements for Intermediate Schools**, SEF E2, Ryerson Press, Toronto, Canada, 1969

2) See for example the presentation booklet **Integrierte Gesamtschule in Frondenberg Kr Unna Teil 1**, Architektengemeinschaft, 1000 Berlin 30, Ahornstrasse 4

II. Characteristics of the models brought into play by the design of facilities for multi-option schools

28 As indicated above, the models referred to by most of the projects or experiences studied involve two common characteristics they give the most coherent possible representation or image of what is desirable, and they attempt to forecast the expected state of affairs, or in other words to apprehend in advance the achievement of what is sought.

29. The models brought into play by the design of facilities for the multi-option schools generally ensure their coherence by reference to a body of educational principles, often expressed in negative form or on the basis of a criticism of the traditional educational system. Table 3 gives two examples of a body of principles defining the concept of a school with a view to determining the most appropriate buildings and equipment The first (A) summarises the main points in a chapter setting out guidelines in a manual of specifications addressed to those responsible for school building, and the second (B) is the result of an analysis of documents carried out by a team responsible for evaluating schools already built.

30 More generally, these principles may be said to express the main choices regarding the multi-option school with respect to

a) **school organisation**; organisation on the basis of the class group is rejected in favour of a flexible organisation allowing differentiation and individualisation of education;

b) **educational content**; uniform curricula structured around independent subjects are replaced by adjustable curricula (choice, options, differentiated paths) desegregated and partly integrated;

c) **form of teaching**; this should no longer be centered on the teacher, but on the « resources » available in the pupil's environment (including the school); the dependency of the pupils must give way to a process of self-learning,

d) **main functions of the school**; these are not confined to teaching in the strict sense, but should include a twofold social function, the openness of the school to community life and the development of the school's own internal social life, which sometimes aims at being a microcosm of democratic life

TABLE 3

Two examples of a body of principles defining a concept of the school with a view to the determination of facilities

A) Principles of organisation of the multi-option school under the SEF programme, Toronto, Canada (1)
1 Flexible and non-hierarchical organisation without reference to age or level (the non-grading principle)
2 Extension of individual work based on the responsible use of diversified « resources » (self-learning aids)
3 The curriculum conceived as an individualised integration of multiple activities (the open-ended principle)
4 Integration and balance of the various subjects
5 Participation of the pupil in his own education
6 Education based on teacher co-operation

B) Basic principles laid down as starting points for the design of SAMSKAP Schools, Malmo, Sweden (2)
1 Adaptability of the facilities
2 Integration of the school with various social activities.
3 Variation in the activities of the pupils.
4 Variation in the grouping of the pupils
5 Teamwork of the teaching staff.
6 Co-ordination of the various subjects
7 Availability of a wide choice of resources
8 Integration of remedial teaching.

Sources (1) Based on SEF E2 op cit., pages 27 to 32
(2) Based on De öppna skolorna i Malmoregionen (The open plan schools in the Malmo region), published under the direction of Bertil Grän, Lararhogskolan, Malmo, Sweden, 1972, page 12

TABLE 4

Breakdown of time spent on various forms of work in the traditional model and in the innovative model of secondary education in the experimental district of Skelleftea "Sweden"

	Traditional model	Innovative model
1 Teachers (percentage of time spent with pupils)		
— Teaching in class/large group	45 0	14
— Individual tuition, stimulus, etc.	46 5	66
— Leading and listening to oral tests and accounts, etc	5.0	9
— Leading diagnostic tests, written and oral accounts	3.5	10
— Evaluation of work together with the pupils	0 0	1
	100 0	100
2 Pupil's working methods (percentage of pupil time)		
— Teacher-led instruction	45 0	14.0
— Individual or group work by pupils	46.5	61.5
— Miscellaneous reporting, diagnostic tests, evaluation	8 5	24.5
	100 0	100.0
3 Grouping of pupils (percentage of pupil time)		
— Pupils working individually or in pairs	10	34
— Pupils working in small groups	40	43
— Class tuition	50	23
	100	100

Source Based on S Marklund The Role of the Teacher in Educational Innovation in Sweden ' in **The Teacher and Educational Change A New Role. General Report**, Vol I, OECD, Paris, 1974, page 318

31 In conjunction with these educational choices, the models describe the expected functioning of the schools to be built This functioning is the product of innovatory experiences but it is at the same time the expression of a will to change established practice. Table 14 describes an example of the changes recorded in schools of a new type as compared with schools of the traditional type. More generally, it can be said that the models adopted prescribe changes in the following aspects of the functioning of the school.

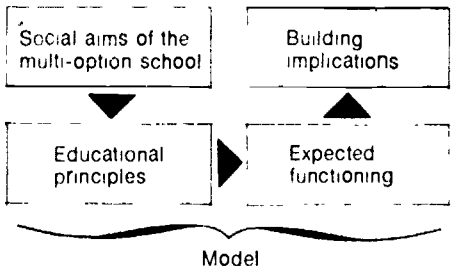
a) **Changes in the nature of activities.** The known activities of the traditional school are dealt with in an appreciably different way; the pupils work singly or in pairs more often and in classes of the usual size less often;
activities generally reserved for a much more advanced level of studies (work on programmed material, library work, etc) become current and usual for young adolescents;
new activities appear (e g self-learning activities, project work, planning by pupils of their own work, etc.).

b) **Changes in length and pace.** The uniform pace, under which school hours are broken into periods of equal length (40 minutes or one hour) is doomed to disappear in favour of a combination of shorter modules (the Swedish *Laroplan* advocates modules of 20 minutes) allowing greater diversity in the effective length of work periods or in working methods within the same period

c) **Changes in work organisation.** The aim is to go beyond the monotonous teaching practice where all pupils of the same level (or the same class group) do the same thing at the same time A greater flexibility of timetabling should allow a diversity of tasks to be carried out at the same time in the same group (or set of pupils)

III. How these models are used

32. At first sight, it seems natural that the definition of the facilities needed by the multi-option school should be inferred from the models which specify the concept of these schools In fact, the work of a great many teams clearly seems to be based on the assumption or belief that there is a logical link between educational concepts and architectural proposals The SEF report (1) asserts the principle that « educational functions and requirements should determine design form » If the word determine is given its full force, then it is clear that from this point of view it is a logical imperative that the buildings be made to depend strictly on the educational concepts This might be expressed as follows



33 In reality it is always difficult to see how the transition is effected between the terms of this chain For example, the same SEF report juxtaposes, in order, data on the psychology of the adolescent in modern society, the major trends of modern education which characterise the intermediate school, and the description of the various components which should make up this type of school, preceded in each case by the functions which that component must fulfil But this juxtaposition presupposes a logical continuity rather than explaining it. This belief in continuity is often voiced after the event by architects and those responsible for building. However, this continuity becomes really clear only after the projects are formulated, and an understanding of how it is established would make it possible to draw valuable lessons from the various realisations For this purpose what must be questioned is not the validity or the interest of the solutions proposed for multi-option schools, but the methodological assumption Is the design work purely deductive once the educational concept is defined ? Should the word « implications » included in the title of this study be interpreted in its logical significance ?

34 Our observation of the various projects or school buildings and of the work of design teams (insofar as such work can be observed after the event) seems to us to imply a negative answer to these questions Some light may be thrown on this point of view by the following comments.

a) Schools inspired by the same educational principles and built at the same time may differ totally in their architectural expression

Example 1 - The two *Gesamtschulen* of Frondenberg and Scharnhorst in Nordrhein-Westfalen are built according to two different plan layouts, the first is based on a unit of space *(Grossraum)* of 250 m2, which accommodates a working unit of 105 pupils with three teachers, for activities which are initially common and subsequently differentiated The same educational formula is put into practice at Scharnhorst in units of four enclosed classrooms of the current type, two information rooms for large groups being available for all the units of four classrooms (see figure 2).

Example 2 - The same value attached to information activities, and the same principle of the maximum availability of educational resources may lead to the library or documentation centre being located in the middle of the building at the exit from all the classrooms (SAMSKAP solution, adopted and reinforced at Frondenberg) or on the contrary to the dispersal of a large part of these facilities, which are located in the various sets of accommodation (the solution proposed for Maiden Erlegh, see para.104)

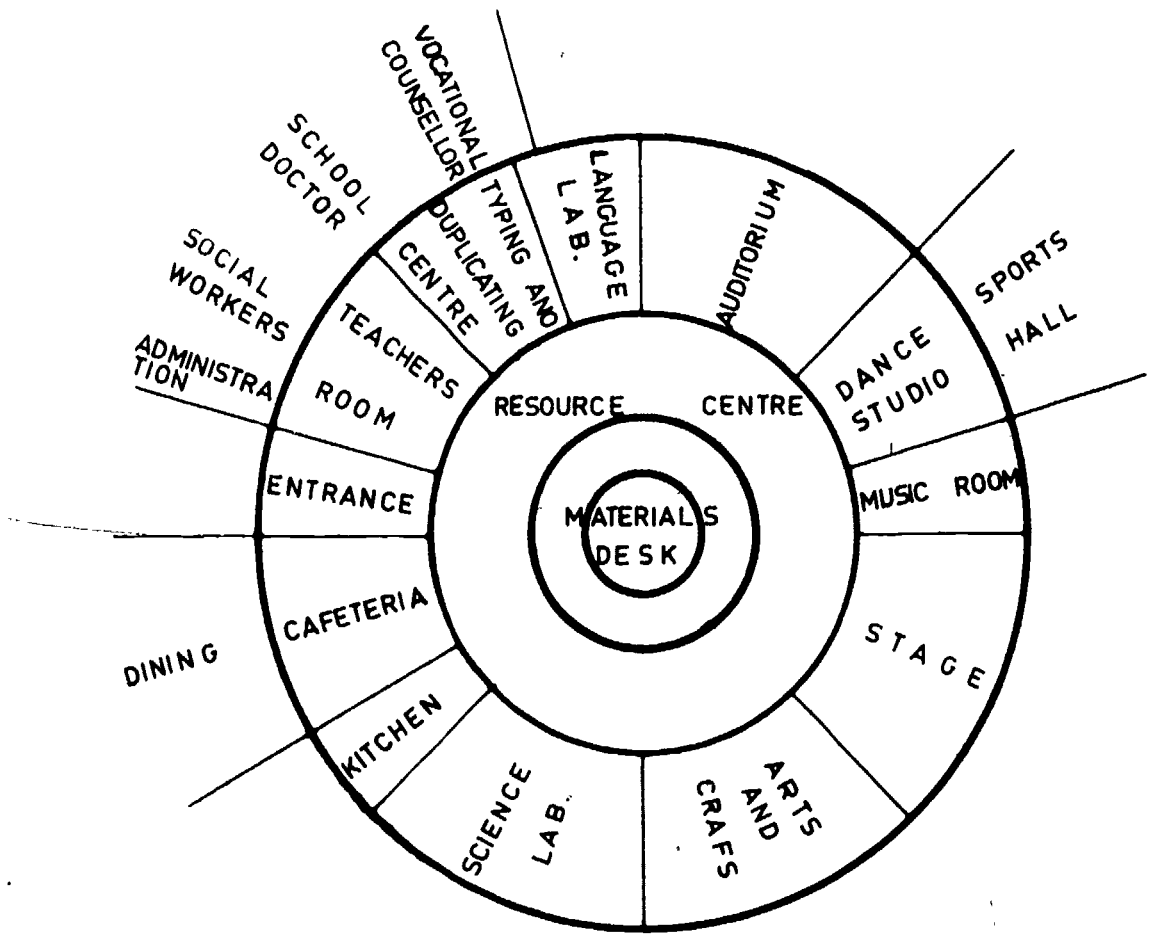
It can therefore be seen that there may be several responses to the same need or the same principle. Those responsible do not generally voice any certainty as to the superiority of one solution over another, they are more commonly conscious of the need to make choices during the process of formulating projects and of the difficulty of setting those choices in a deductive context

b) Models come into play at different moments, some designers distinguish between educational models and architectural models, the former being closer to what has been described above, while the latter consist of diagrams showing relationships between spatial elements. The circular diagram used to define the SAMSKAP schools (2) and the diagram illustrating the design of the Frondenberg *Gesamtschule* (3) can be regarded as examples of this last type of model But it is still difficult to see how the transition is made from one type of model to the other, from those which are expressed in conceptual terms to those which are already operational. Furthermore, the architectural models themselves must be translated into specific projects which sometimes differ appreciably from each other The result is that the question arises whether the translation of the model into a project is not more important than the construction of the model The Frondenberg design team for example, would answer that question in the affirmative, it in fact considers that the first diagram (which nevertheless still heads the booklet introducing the school) was considerably modified by the work of the team; the educational concept evolved

1) SEF L2., op. cit., page 37
2) See figure 1
3) See page 68

FIGURE 1

Model of the SAMSKAP schools in diagram form



and became more precise technical and practical reasons substantially modified the model

c) The habitual use of models does not seem very effective They are indeed too often given a normative and wishful character, in other words, they prescribe a functioning for the multi-option school without specifying the factors which condition it. Now it is easy to see that the functioning which can be observed in innovatory schools differs appreciably from the functioning prescribed, that is to say the functioning which should serve to define the demand for facilities for the new schools It may also be asked whether the models are not most often confined to a minor role, reduced to no more than an image of models « in the uninteresting sense that a tin soldier is a model of a soldier » (1) In the course of our studies we have encountered no truly operational use of models. Now, models of how a school is to function are necess . y as instruments of forecasting, particularly so as to « anticipate problems » (2) This role does not conflict with that which they already play as instruments of communication, as we have indicated above, but it does go beyond it and gives models their real meaning.

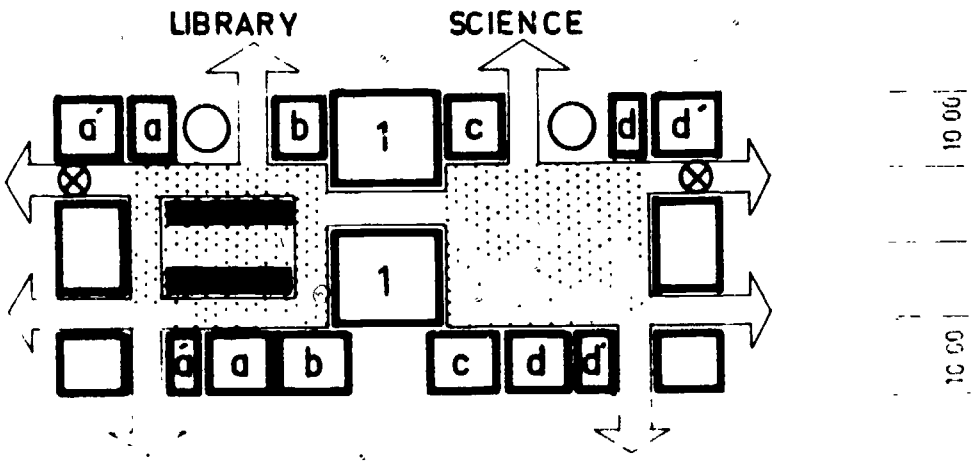
d) Finally, it seems that the coherence of the principles which define the models should in turn itself be questioned. In fact, actual reality shows that it is not easy to reconcile all these principles and that many internal tensions necessarily arise in a dynamic school society This is, moreover, the conclusion reached by the evaluation study which was carried out on the functioning of the first SAMSKAP schools in the Malmo region and the purpose of which was to find out whether the principles underlying the

1) The Management of Innovation in Education, Centre for Educational Research and Innovation, OECD, Paris 1971, page 22
2) Idem, Page 25

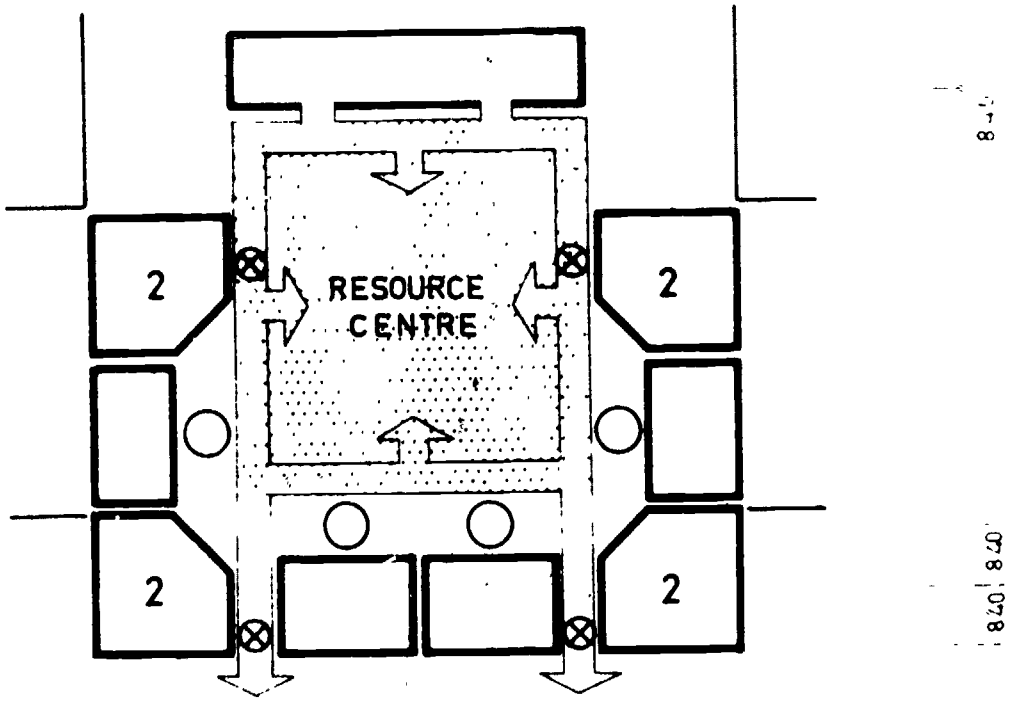
FIGURE 2

Two different schools based on the same educational model

I . SCHARNHORST



II . FRÖNDENBERG



Two schools were built in the same year and in the same region on the basis of the educational model of the *Gesamtschule*. In I, the groups of pupils are deployed into four classes (a or a', b, c, d or d') from each of the large information halls 1, in II, the large classrooms 2 make it possible for a 105 pupil unit to receive collective information and then to work in groups of various sizes. In I the open areas are primarily used for social life and in II for study activities.

- STAIRS
- TEACHERS ROOM
- OPEN AREAS
- CIRCULATION
- CLOAKS

concept of these schools were in fact matched by what went on in their new buildings « The principles on which the work of the SAMSKAP group and the design of the open schools have been based cannot be simply placed beside one another to give some kind of total cumulative effect Often they must necessarily conflict In the individual case, whether it concerns the layout of buildings or teaching, one is often forced to give one principle priority over another It is not possible to decide upon a system of priorities that will then apply once and for all For this reason different practical solutions are produced, even though the basic principles are the same » (1)

IV. The functioning of the multi-option school and its internal tensions

35. Most of the schools demonstrating new building solutions that were visited in the course of this study had only recently been constructed; their functioning often still remained incomplete, either for lack of material or equipment, or for lack of staff, or more commonly because the staff had not yet discovered or integrated all the behaviour patterns necessary to adapt their work to the new instrument they had to use. It was therefore impossible to draw any lesson from their experience by merely observing their activities On the other hand, it proved fruitful to consider the problems facing them and the tensions between various aspects of their activity Beyond their difficulties due to circumstances, the fundamental character of certain problems was very evident It followed that the question was not so much that of understanding how new facilities made it possible to apply innovatory educational concepts, but above all of understanding how the facilities intervene — as one factor among others — in the way in which the school tackles and handles the problems it cannot evade

36 This comment is only made to underline the deceptive character of approaches which deem it possible to deduce architectural specifications from educational principles Such approaches derive from an optimism which masks the problems or attributes the difficulties to constraints external to their model Now, if models can be used to anticipate problems, it is because they are themselves problematic For example, it cannot be said that there is a pedagogy of freedom which can be encouraged by this or that type of facility, there is in fact an educational problem of free choice and of compulsion, and it is this tension which has to be faced by the designers of the school as well as by those who have to run it. We shall therefore now consider the main tensions which must be integrated in the model for the multi-option school.

A. Common Core and Options in the Curriculum

37. In a democratic society the school must provide young citizens both with a common frame of reference and with a training in freedom of choice which implies a certain differentiation in the programmes followed by different individuals in the course of their education. The choices gradually determine the orientations, thus fixing differences and limiting the importance of common references The co-ordination of these two objectives is important because it is closely linked with the essential characteristics of the multi-option school as shown in paragraph 16 But it is difficult and does not come about with balance or harmony, quite the contrary, freedom of choice is always threatened by the tendency of the organisation to become frozen in its structures; similarly, common education is always threatened by the dispersion of choices. This is the explanation of the evolution of certain education systems such as secondary education in Ontario or the Swedish Basic School, in which the importance of options in the programmes has varied from time to time, tending alternately to opposite extremes (2).

38 The *College de Sainte-Maure-de-Touraine* (France) gives an interesting idea of a tension of this kind It provides innovatory education in facilities of the old type and options play an important part They are organised every afternoon as a complement to the compulsory activities conforming with the official programmes, subject to a few adjustments The problems most acutely felt by the teaching staff are the following

- How to get over the fairly wide separation between the pedagogy of freely chosen subject areas and compulsory ones ?
- How to increase real freedom in optional activities ?

At the present time, in effect, the great dispersion which would result from the organisation of twenty optional « ateliers » which between themselves lack coherence, is offset by the compulsory rotation of pupils between the various « ateliers » and the imperative limitation of the numbers in each of them In this way constraints are again introduced into this pedagogy of free choice Furthermore, there seems to be a wish to get back to a common education through the combination of the numerous choices which each pupil is obliged to make.

39 Do these internal contradictions amount to a weakness in the system or are they a factor in the educational drive of this team ? It would be interesting to look at this question

- As regards the facilities, this team has had to ensure that the choices it wanted to offer were made physically possible by making spontaneous alterations in a building unsuited to the form of education chosen; rigging up a pottery workshop in the basement, art and drawing studios, a vivarium and an experimental glasshouse in the school stores In this field, too, significant contradictions emerged. Even more than the availability of teachers, it is the inadequacy of certain facilities which perforce limits the choices
- The shortage of resources makes competition all the keener between the provision of new possibilities for optional activities and the adaptation to the new methods of the accommodation reserved for compulsory activities
- The optional activities and the common core activities co-exist poorly in specialised accommodation, such as science laboratories This specialised accommodation is in fact adapted for teaching of the frontal type which is in conflict with the spirit of the system of options; the optional activities call for continuity, for project work, and therefore for the possibility of leaving current work and assemblies set up, all things which are impossible in accommodation used for common core activities

40 Leaving aside this example, which is almost an example *a contrario*, so unfavourable are the conditions in which the problems have to be tackled, we can say that the facilities of the multi-option school are affected in two ways by the tension described.

a) At the briefing and design stage, insofar as the school organisation provides for a common core and optional activities which the pupils take up in a way which is not predictable, a distinction must be drawn between what can be quantified in advance with some precision and what cannot. This process is more fully explained in Part Three But it is already quite clear that the non-quantifiable introduces an element of uncertainty into the planning In particular, there is a danger of arriving at situations in which accommodation provided for some optional

1) Gran op. cit., page 215

2) These are mainly options, as defined in paragraph 19 (a), (b) and (c)

1. An improvised language laboratory
Collège de Sainte-Maure-de-Touraine (France)

of these possibilities The facilities are not the sole source of possibilities to be taken into account in understanding this question, but it is quite clear that they partly determine this development The problem for designers is therefore to find out what types of facilities afford the widest range of possibilities This range is necessarily limited, for obvious reasons, the facilities therefore set limits to the freedom of choice In practice, this limitation is relative and depends on the behaviour of the users It is not unusual to find that the possibilities afforded by the facilities are far from being fully used.

activities remain under-employed, while there is a shortage of facilities for other optional activities or for common core activities Examples can, for instance, be found of schools with no excessive overall provision, whereas there are far too many places in the domestic science accommodation

b) The development of optional activities depends on the possibilities offered to them, and particularly on the diversity

B. Common Education and Diversity of Attainment: Heterogeneous Groups and Differentiated Groups

41. Paragraph 15 (c) stresses the importance of differentiation in the pedagogy of the multi-option school This principle is, however, interpreted in different ways in the actual functioning of schools

— Sometimes internal differentiation predominates, for example, a heterogeneous group, constituting a unit, is given common information and then splits up into sub-groups which follow up this information and handle it at different levels or from different aspects; it is also from this unit that the pupils split off into options.
— Sometimes the differentiation is external; the sub-groups are already in existence, as it were, before the distribution of the pupils, who are assigned to them, for example, according to aptitude. If this aptitude is determined once and for all and defined as general aptitude, the result is organisation by groups of the same general level (streaming) which is in conflict with the aims of the multi-option school. If it is defined for a given subject, the result is ability groups by subject (setting)

42. In fact, these are not opposing types of methods, but merely tendencies of which it can be said that one seems to prevail in one school and the other in another For example, the new German *Gesamtschulen* in Nordrhein-Westfalen are developing the first tendency, in reaction against the situation in the first schools of this type, mainly in Berlin, where the practice of too systematic an external differentiation resulted in rigid setting The two tendencies are, in practice, interlinked, as though one were the obverse of the other, there is an inevitable tension between them The heterogeneous groups, providing common education for children with different backgrounds and skills, originated in the desire to break down the segregation of the traditional school But equalisation of opportunity is not necessarily attained by subjecting all children to the same treatment That is why differentiation is introduced within these groups, particularly to help children less favoured from the socio-cultural point of view, who are penalised by strictly equalitarian education. But differentiation in turn generates difference, the complexity of the school organisation, the pressure of parents or examinations, and sometimes the acquired

habits of the teachers, mean that the differentiated sub groups become stabilised and acquire a certain autonomy and that the reference to the heterogeneous group is whittled away The multi-option school is then threatened by the return to segregation into groups with different skills and socio-cultural levels

43. Do the nature and organisation of facilities play any part in the dynamics of these tensions, which arise mainly from the educational organisation of the school ? Undoubtedly they do, as is shown by certain examples; at Scharnhorst (1) differentiation operates among a group of pupils (140 - four classes) occupying a unit of four areas. This means that the distribution of pupils must be limited to four sub-groups of equal size One also often finds a lack of an extra corner or an additional area to vary the work in the course of a period, whereas this extra space could easily be found if it were possible temporarily to regroup a larger number of pupils than each of the classrooms can accommodate

44. At Frondenberg, in contrast, the big room where 105 pupils and three teachers work simultaneously theoretically allows a more flexible use of the unpartitioned space In practice, however, the physical characteristics of this room, and particularly its acoustic qualities, only allow two extreme types of group, the big group of 105 or the small group (6 to 8) Now, experience has shown, contrary to what was thought by the team of educationists associated with the design, that it is impossible to keep to such a narrow range, medium sized groups are necessary in this type of teaching/learning situation and they are difficult to fit into the open space

45 It is thus found that the nature of the facilities may impose limits on differentiation, with the result that it then obeys imperatives other than those springing from the life of the groups themselves Facilities also enter into the « openness » of the sub-groups (the possibility of a pupil changing from one sub-group to another) as well as into the link between differentiated sub-groups and the heterogeneous group One of the justifications of the « open plan » is precisely that it allows at the same time the organisation of sub-groups occupied on differentiated tasks, the variation of their respective size, their openness, and the constant recognition of belonging to the heterogeneous group It must not, however, be assumed from this that the open plan in itself can solve all the tensions described It can sometimes be seen, for example, that rooms are reconstituted in the open space using furniture as partitioning to separate the sub-groups from each other, just like traditional classrooms

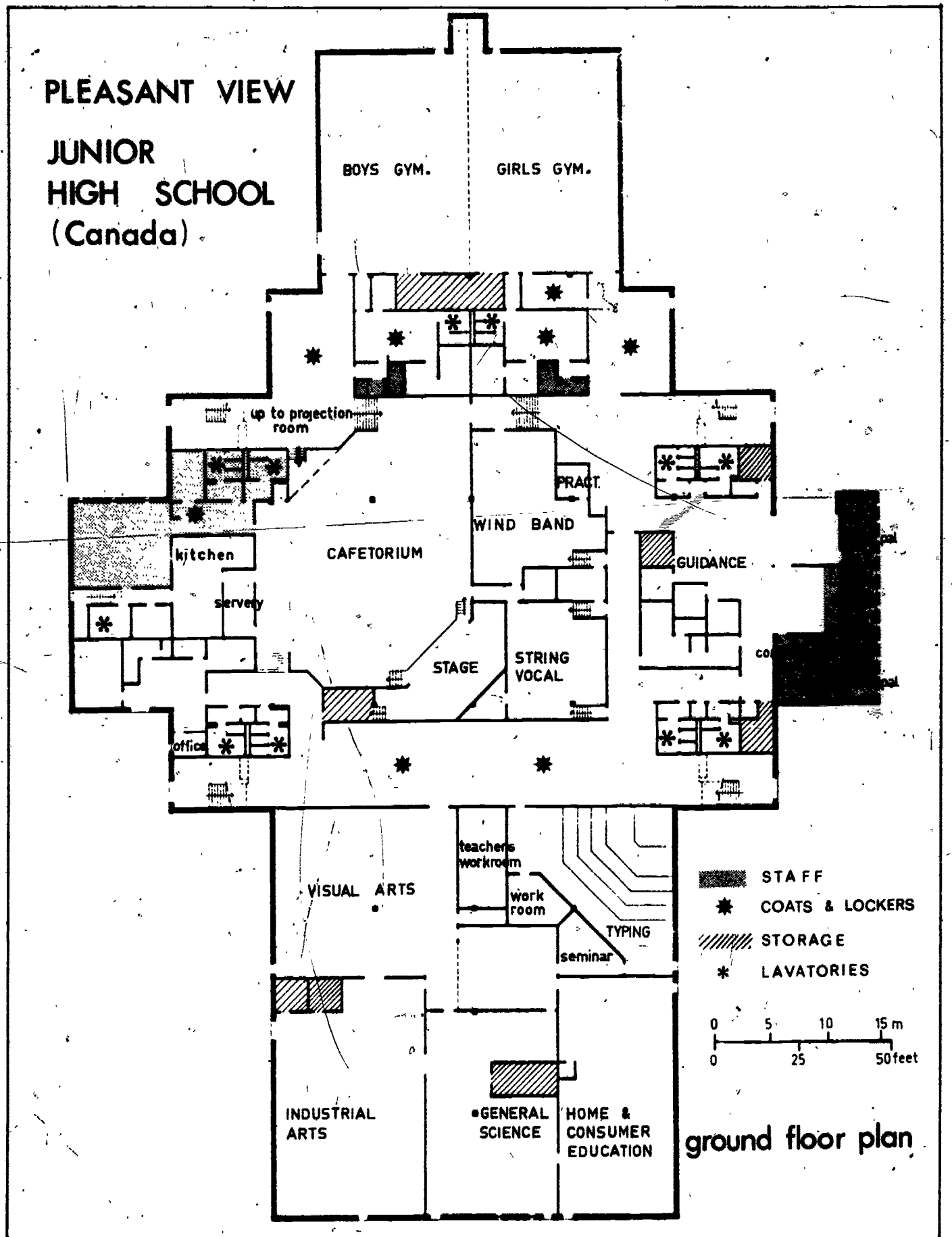
1 bis. Collège de Sainte-Maure-de-Touraine
Improvised pottery workshop in a basement.

C. Remedial Education and the Integration of Minorities (Handicapped Children, Immigrants)

46. The measures of compensation or support taken in the interests of less favoured children may run counter to the principle which inspires them; a true democratisation tries to lessen inequality of opportunity These measures, in effect, presuppose special attention, special classes, activities run by special staff and an education which is generally called « special ». Now, many schools with options have refused to allow this special education to be isolated in special classes and integrate handicapped children (whether socially and culturally, psychologically or physically) as far as

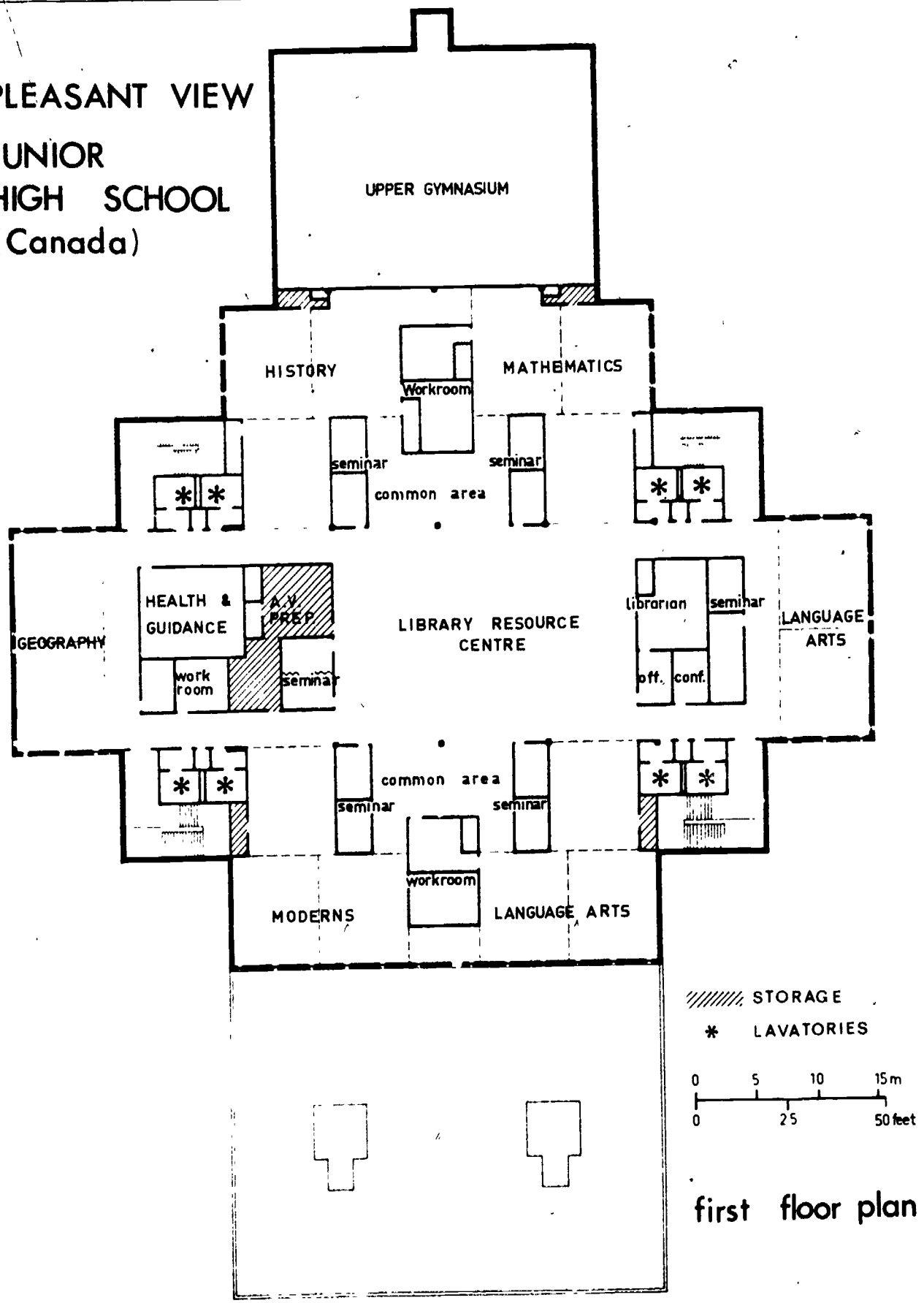
1) Paragraph 34 (a) Example 1

PLEASANT VIEW JUNIOR HIGH SCHOOL (Canada)



ground floor plan

PLEASANT VIEW JUNIOR HIGH SCHOOL (Canada)



first floor plan

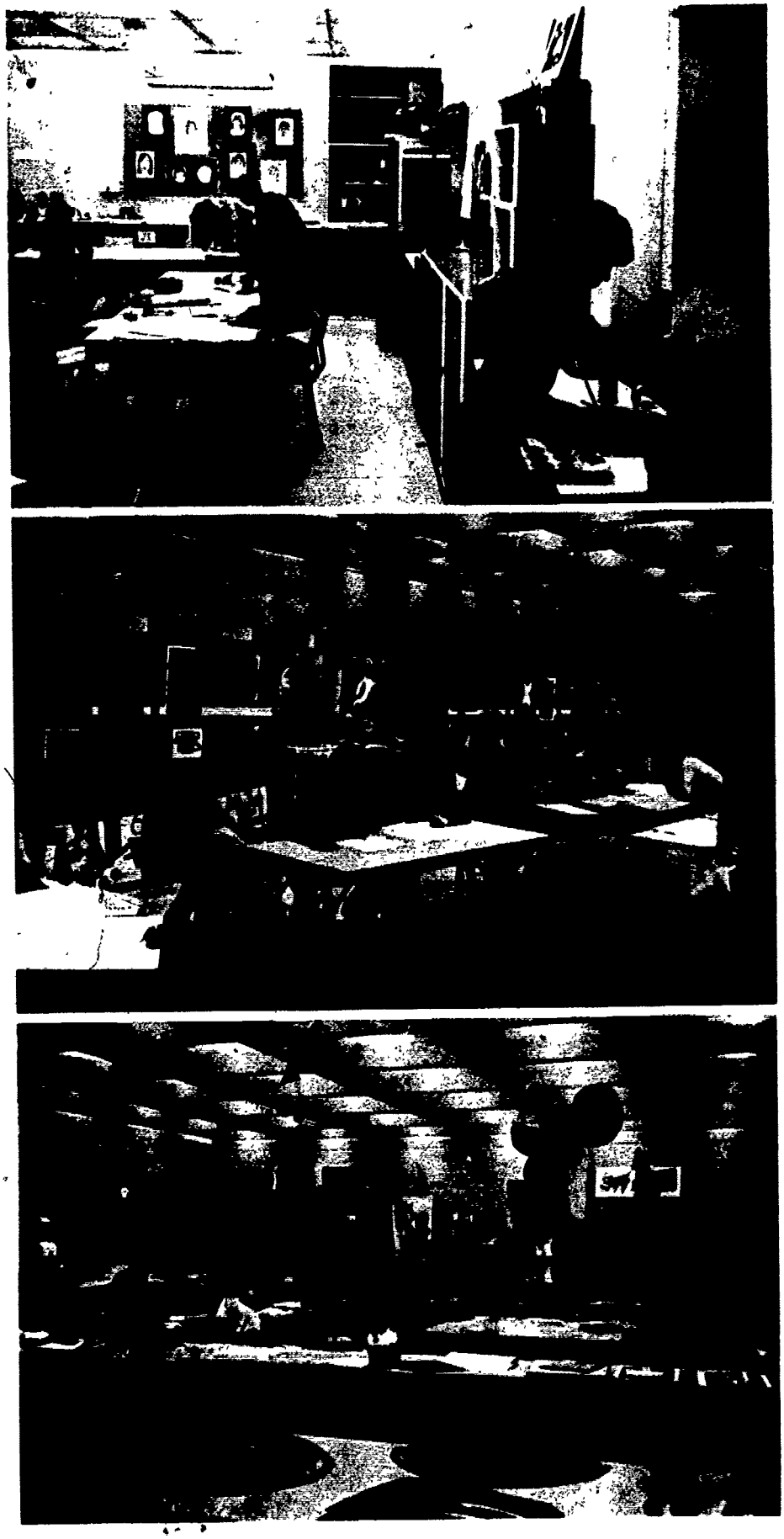
TABLE 18

Comparison between SEF's theoretical programme for an intermediate school (7th, 8th and 9th years) of 878 pupils and the programme implemented at Pleasant View Junior High School with the same enrolment

TYPE OF FACILITY OR SPACE	SEF'S THEORETICAL PROGRAMME				PROGRAMME IMPLEMENTED AT PLEASANT VIEW SCHOOL			
	square metres		square feet		square metres		square feet	
TEACHING AREAS								
General Learning Areas								
- teaching stations	17 x 69	1 173	17 x 750	12 750	16 x 69	1 104	16 x 750	12 000
- common spaces		272		2 975		295		3 200
- seminar rooms		84		900	6 x 14	84	6 x 150	900
- teacher workrooms		156 1 685		1 705 18 330	6	147 1 630	6	1,600 17,700
Unified Arts Area								
Industrial arts		295		3 200		290		3 150
Home economics		230		2 500		225		2 450
Visual arts		209		2 275		207		2 250
General science		330		3 550		220		2 400
Unified arts common								
- teacher workroom	58		630		48		525	
- pupil activity area	62	120 1 184	675	1 305 12 830	55	103 1 045	600	1 125 11,375
Music Areas								
instrumental room		120		1 300		120		1,300
vocal room		92		1 000		92		1,000
practice rooms		27		300	3 x 9	27	3 x 100	300
teacher workroom		15 254		165 2,765		14 253		150 2,750
Typewriting Area		110		1,200		(commercial subjects) 208		(commercial subjects) 2 275
Physical Education Area								
gymnasium (double)		580		6 300	2 x 26 9	538	2 x 2 925	5,850
- teacher workroom		33 613		360 6,660		37 575		400 6,250
Circulation about 20%		768		8,357	see below	—	see below	—
TOTAL TEACHING AREA		4 610		50 142	(without circulation)	3 711	(without circulation)	40,350
ANCILLARY AND ADMINISTRATION AREAS								
Information Service Area								
- library resource centre	567		6 162			620		6,750
- audio visual service area	41	608	450	6 612		67 687		725 7,475
Administration Centre								1,400
(including meeting room)		113		1 225		129		550
Counselling Centre		55		600		50	425 - 750	1,175
Health Centre		41		450	39 - 69	108		
Cafetorium								
cafeteria/auditorium		368		4 000		412		4 475
stage and projection booth		88		950		92		1 000
- staff lounge and dining area		74		800		80		875
— kitchen and servery		55 585		600 6 350		69 653		750 7,100
Physical Education Ancillary Areas								
- equipment storage		37		400		37		400
- outdoor storage		18		200		18		200
- changing rooms		74		800	2 x 44	88	2 x 475	950
— showers		55 184		600 2 000	2 x 14	46 189	2 x 150	500 2,050
					2 x 9		2 x 100	
School Storage Areas		37		400		41		450
Lavatories								
— for teachers		27		300		46		500
— for pupils		165 192		1 800 2 100		189 235		2 050 2,550
Circulation about 20%		360		3 947	Total	1 080	Total	11,750
TOTAL ANCILLARY AND ADMINISTRATION AREAS		2 175		23 684	(without circulation)	2 093	(without circulation)	22,750
SERVICE AREAS	878 x 0 65	565	878 pupils x 7	6 146	(of which 373 for lockers)	561	(of which 4 050 for lockers)	6,100
GRAND TOTAL NET		7 350		79 972		7 445		80 950
GRAND TOTAL GROSS		8 178		88 848		8 059		87 510

Comparison between the SEF programme and the norms of the metropolitan Toronto school board

Net area	Square metres		Square feet	
SEF area recommendations		7 350		79 972
Official norms	878 pupils x 8 3	7 287	878 pupils x 90	79 020
Gross area				
SEF area recommendations		8 178		88 848
Official norms	878 pupils x 9 2	8 077	878 pupils x 99 9	87,712



56, 57, 58. The visual arts area.

THE LIBRARY RESOURCE CENTRE OF THE INTERMEDIATE SCHOOL

In view of the important role played by documentation and self-learning activities in the multi-option school, it seemed of particular interest to include in this section a description of the facilities prescribed by SEF for the library resource centre at the level of the intermediate school (1) SEF not only clarifies the implications of the concept but also provides the architects with detailed instructions regarding the functions, contents and internal layout of such a centre.

The description will be followed by a concrete example illustrated by the plan of the library resource centre at Arlington Senior Public School The centre has been fitted out with *ff5* furniture, which is a sub-system of the SEF construction system The arrangement of the furniture shown on the plan is only indicative since it is often changed by the pupils and teachers. These changes are facilitated by the modular nature of the furniture. Drawings of the furniture units used in the library resource centre follow the plan, and each unit bears its *ff5* catalogue number enabling it to be identified on the plan The various units are formed from a number of easily recognisable basic modules (2)

Functions

The library resource centre today plays a key role in the educational process and serves as the « hub » of the school. Flexible timetabling, independent study, emphasis on creativity, non-grading, seminar discussions, team-teaching and the growing interest in community use of school facilities are making unprecedented demands upon the school library. They place the librarian in a key position as a member of every teaching team in the school. To meet these new demands, the Centre itself requires much more space than hitherto and must be able to offer a wide variety of material in different media The main functions of the library resource centre can be summarised as follows:

- facilitating the pupil's search for information, i.e.
- help and advise the pupil in searching and locating the information he needs (over-abundance of resources);
- assist and guide the pupil in his reading (need for a wide variety of materials at different levels and on different subjects);
- provide the necessary framework for pupils engaged in projects, class work or independent study;
- ensure wide circulation of materials together with the most extensive library hours possible, in other words a library should « proffer information rather than ration it » (3),
- facilitating the work of the teachers: receive them, encourage their using documents and media, help them to work in teams and co-ordinate their teaching;
- serving the community within the framework of a process of recurrent education This accessibility to the public must not however interfere with its primary function as a school's library, which should have priority.

Location, Types of Spaces and Conditions of Use

Because of the nature of its functions, the library resource centre should be strategically located, particularly in relation to the general learning areas Ground floor location is desirable in that it ensures easy access to the public but so is the location away from noisy activities

In its report on the elementary school E1, SEF stated that library accommodation of 30 per cent of the school's enrolment was an ideal. According to SEF, this figure of 30 per cent may even turn out to be conservative a few years from now in the light of the growing use of information materials. Since the present ceiling cost formula for the intermediate school does not allow library accommodation of more than 20 per cent of enrolments, it is essential to provide for the possible future expansion of the library resource centre. This means that in a senior public school built to accommodate a total of 845 pupils, the library resource centre should be able to seat 170 as follows:

— table seating	50
— carrels	35
— soft seats	25
— seminar room seating	60
	170

The following space distribution shows in detail SEF's area recommendations for such a centre in the school referred to above.

	m2	*sq ft*
— seminar rooms (6) *	83	900
— teacher-librarian conference room	14	150
— AV storage and workroom	18	200
— carrels (34 x 2 30 m2 or 25 square feet) *	78	850
— soft seating (25 x 1 85 m2 or 20 square feet) *	46	500
— tables (50 places x 1 85 m2 or 20 square feet) *	92	1,000
— workroom (s) *	37	400
— librarian's office *	14	150
— shelving for 20,000 books (5 shelves high, double units)	110	150
— periodical area (one year's files, back copies in workroom)	14	1,200
— vertical files (documentation)	14	150
— card catalogue (about 60.000 cards needed for 20,000 books and perhaps 40,000 cards for non-print materials, i.e. a total of 100 drawers)	9	100
— charge area	14	150
— flexible display area	1	15
Total	544	5,915

*) The numbers and sizes of these areas will fluctuate according to enrolment an I number of centre staff All other areas should, in principle, remain constant.

1) Summary of chapter 7 of SEF E2, op cit. pages 73-85
2) For further details concerning the ff5 furniture see Information Leaflet N° 4, ff5 A Canadian Casework or Furniture and Equipment System for Schools" by Paul Lemssen, Programme on Educational Building, OECD, Paris March 1974.
3) Ralph D Ellsworth and Hobert D Wagener, The School Library Facilities for Independent Study in the Secondary School, Educational Facilities Laboratories Inc New York 1973, page 13

Part of the documentation activities will take place outside the library resource centre. The specialised departments have their secondary centres and borrow materials from the main centre

As regards provision for expansion, three main types of changes can be envisaged.

— that which permits daily reshaping (sliding or mobile partitions which can be opened or closed by the teaching staff between periods);
— that which entails temporary or medium-term expansion by the gradual encroachment on neighbouring spaces or teaching areas; this type of change would necessitate relocation of demountable partitions and of certain services, a re-arrangement which would take two to three days;
— that which would imply the extension of the library resource centre by enlarging the building itself; this would be a major long-term change and would probably occur only once in 10 to 15 years.

Internal Environment

It is essential that the environment of the library resource centre should be lively and stimulating, appropriate to the age of its users. This effect can be achieved partly by selecting bright inviting colours. The following criteria should be respected:

Visual criteria/lighting. Light may emanate from both natural and artificial sources. Whatever the source, it is important to obtain maximum contrast on the object being viewed and minimum brightness contrast at the source; all reflecting surfaces should be avoided A high quality of lighting throughout the library resource centre will facilitate rearrangement of furniture and equipment. Windows are used more as a means of providing contact with the natural environment than as a source of natural light Although glass has been developed which reduces unwanted solar heat and glare, large expanses of window are not recommended.

Thermal criteria. Humidity and temperature should be maintained at levels conducive both to the comfort of the users and the care of the materials

Acoustic criteria. While the seminar rooms, the teacher-librarian conference room, the audio-visual storage and workroom all need to have good sound insulation, complete silence is un-necessary in the other spaces. However, some steps must be taken to reduce noise level

1) Library Technology Reports A Service to Provide Information on Library Systems, Equipment and Supplies to the Library Profession, American Library Association, Chicago 196?

the entire floor surface should be carpeted, a wise selection should be made of materials, textiles and furniture and equipment such as the photocopier should be located as far away as possible from reading and discussion areas.

Carrels. The wide variety of carrels available on the market raises the problem of choice. Some carrels should be wired for the independent use of various types of audio-visual equipment. All should have electronic capability to prepare for the time when access to instructional programmes is more flexible and when computer storage and retrieval of information are less costly. Carrels may be grouped in one area of the library resource centre or dispersed throughout it.

Seminar rooms. In all these rooms, it should be possible to use various media and acoustics, lighting and ventilation should be controllable. If glazed partitions are used, sound insulation would be somewhat reduced. Special blinds would be required to darken the rooms for use of AV equipment All furniture should be easy to move. One of the rooms should be equipped with about ten typewriters for use by the students.

AV storage and workroom. This area should be a soundproofed room equipped with a great deal of shelving in view of the quantity and diversity of the AV material to be stored in it. The room should have several electrical outlets and possibly double-glazed windows (for supervision and acoustic purposes) opening onto the main area of the centre

Teacher-Librarian conference room. This room is similar to seminar rooms but is primarily earmarked for necessary and increasingly important consultations between the teachers and the staff of the centre It might well be located adjacent to the seminar rooms or the librarian's office When this room is not being used by teachers and/or librarians, it could be placed at the disposal of the pupils.

The workroom and the librarian's office. These rooms are reserved for the staff of the library resource centre. Their size will depend on the strength of the staff which, according to SEF, should increase. For an enrolment of 845, SEF recommends three full-time librarians, plus two library clerks. The workroom should lie close to the charging desk and to the librarian's office. If possible, it should have an outside entrance for deliveries. Adjustable shelves and cupboards are required, as well as electrical outlets and a sink. There should also be large working surfaces, two desks with typewriters, book trucks and filing cabinets The librarian's office should adjoin the workroom and a glass partition between the office and the main area would make supervision easier In addition to the necessary furniture (desk, filing cabinets, etc.), the office should have a telephone and an intercommunication system

Furniture. Well-designed, functional furniture is essential. Because furniture may be regrouped frequently, items should be lightweight, adaptable, adjustable, and durable. The quality of the furniture is important because of the hard wear to which it will be subjected. The variations in physical size of the adolescent users create problems and for this reason, furniture in three different sizes should be considered Standards for library furniture and equipment have been developed by the *American Library Association (1).*

Chairs and seats. The long-neglected factor of comfort is today considered all-important. Chairs for use at tables and carrels should be in various heights (40 to 46 cm or 16 to 18 inches), and upholstered seats (lounge chairs, sofas and hassocks) provided

Tables. Many different shapes and sizes of tables are suitable for use in a library Because they will serve a variety of functions, it is difficult to recommend one shape rather than another. However, rectangular tables provide a larger working surface. SEF recommends the following dimensions. 120 x 180 cm (4' x 6') and 120 x 240 cm (4' x 8') with the level of the table top 25 cm (10 inches) above the seat. In general, wood finishes give a warmer appearance than do many laminated finishes.

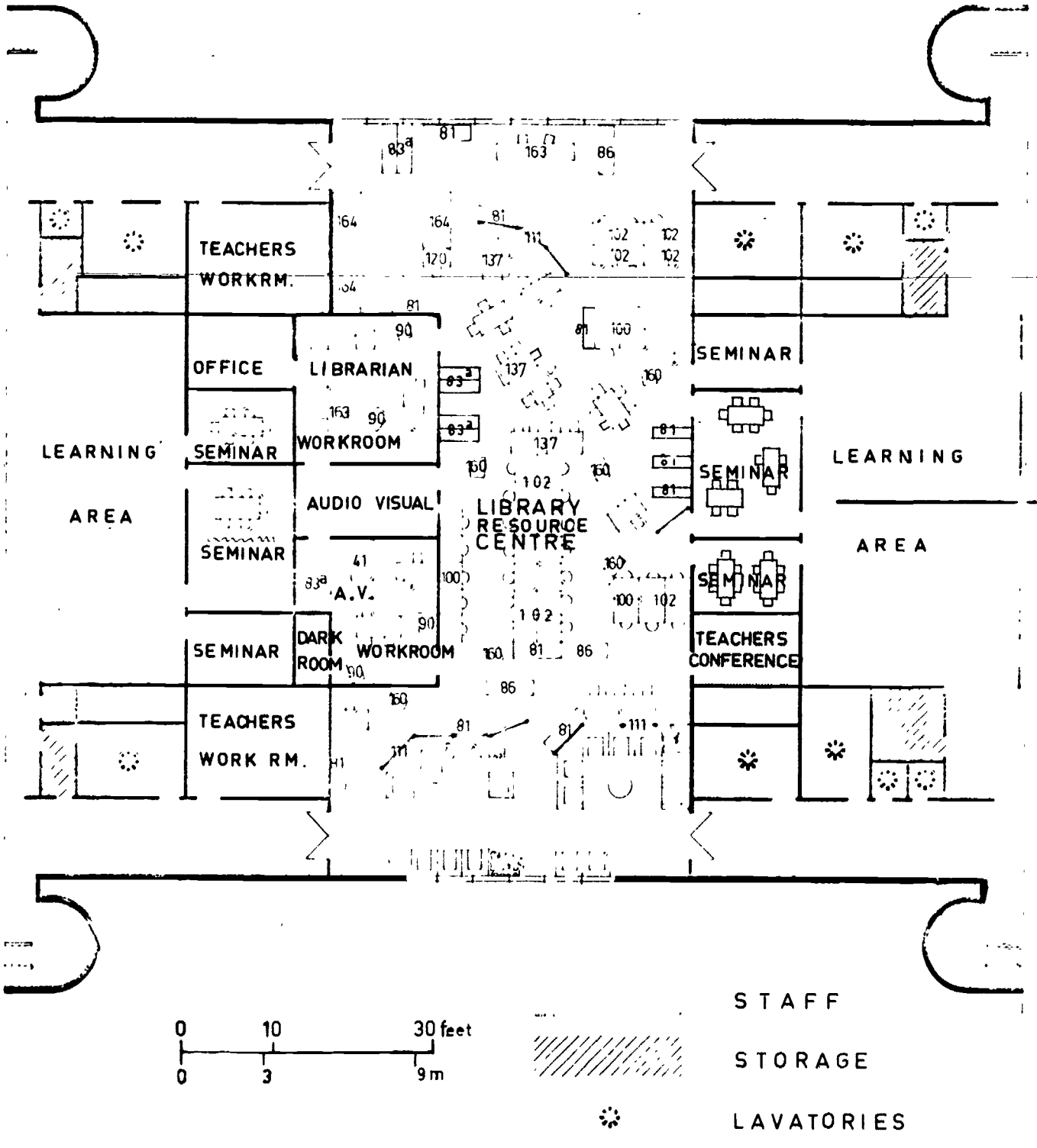
Filing cabinets. These must be particularly durable, and since they will be visible in the main areas their physical appearance is of importance. In particular, the drawers must slide easily open and be designed to provide the maximum drawer space possible. Handles should have no sharp edges.

Book trucks. These are used for storage, display and transportation of all kinds of materials, not only in the library resource centre, but also throughout the school.

Charging desks. The method of circulation control will affect the design of the charging desk. A charging desk is not merely a counter, but provides all the filing devices for checking material in and out. In the future these checking operations will probably be handled using a computer — a method still too expensive for school libraries today. Charging desks should not be so high that they create a barrier between the library staff and the users.

Shelving. Wood shelving is popular for its warm appearance However, what matters is not its constituent material but the function it fulfils. Shelves should not bend, lean, sway or collapse. The standard of a loading rate of 200 kg/m2

LIBRARY RESOURCE CENTRE
ARLINGTON SENIOR PUBLIC SCHOOL (Canada)



(40 lbs/ft 2) will not be adequate for heavy bound periodicals, or for 33 rpm records The recommended standard for loading is therefore 300 kg/m2 (60 lbs/ft 2) with an appropriate safety factor. Because completely level floors are almost impossible to attain, all library shelves should incorporate levelling devices In addition, several different types of shelf are indispensible (some for magazines and periodicals, some for reference books, etc)

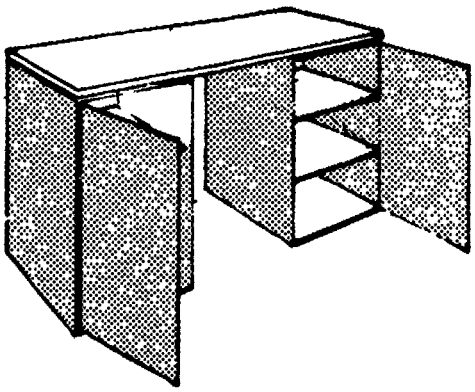
Display and exhibit cases. Many ways are necessary for displaying books, manuscripts and other objects both vertically and horizontally Adequate ventilation and lighting inside the cases are important for the preservation and presentation of the materials displayed in them When the staff of the library resource centre includes AV /technicians, there are likely to be more and better displays

Furthermore, the library equipment will comprise

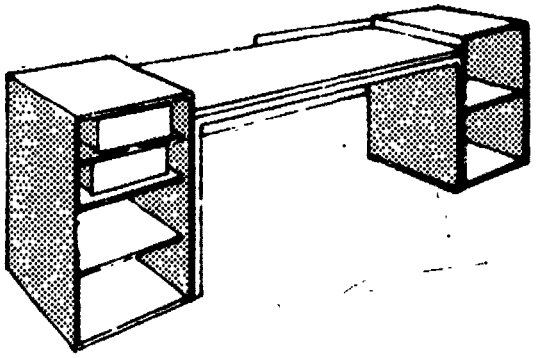
— map cases (horizontal storage);
— typewriters (with special keyboards);
— microfilm readers (some with large viewing screens);
— photocopiers

59, 60, 61. The library resource centre.

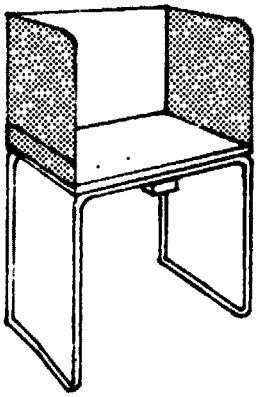
ITEMS OF FURNITURE
FROM THE CAMERON Mc INDOO ff5 CASEWOR



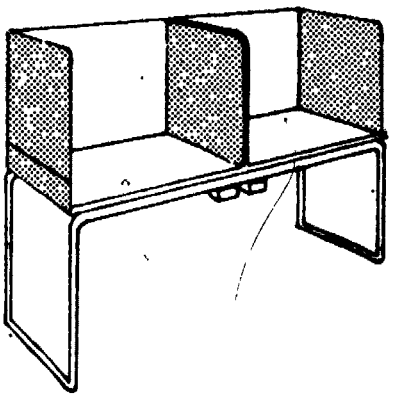
47_ STORAGE COUNTER



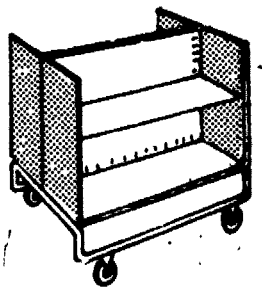
168 _ CHARGING DESK



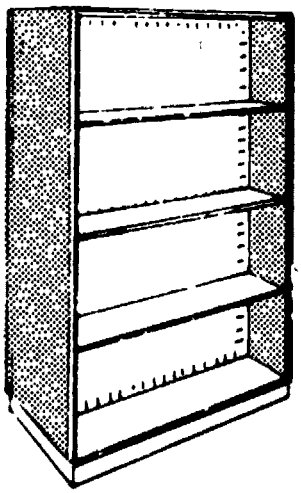
100 _ SINGLE CARREL



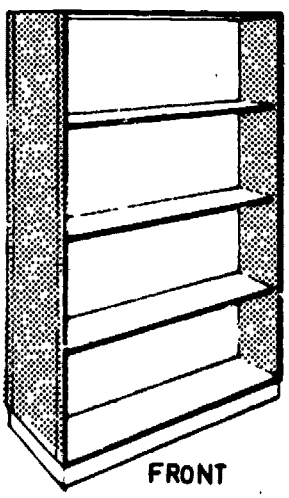
102 _ DOUBLE CARREL

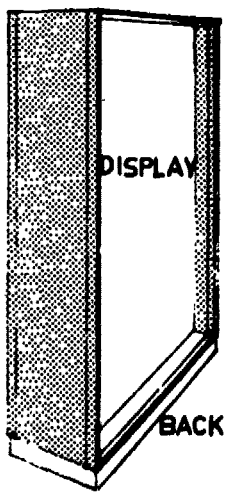


160 _ BOOK TRUCK



81 _ DOUBLE SIDED BOOK SHELVING

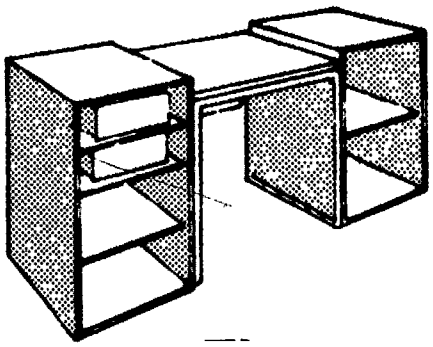




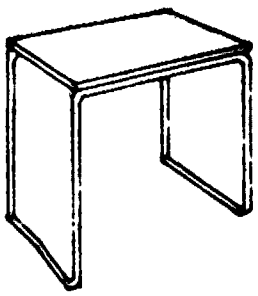
86 _ SINGLE SIDED BOOK SHELVING

NOTE : Numbers refer to the plan of the Library Resource Centre

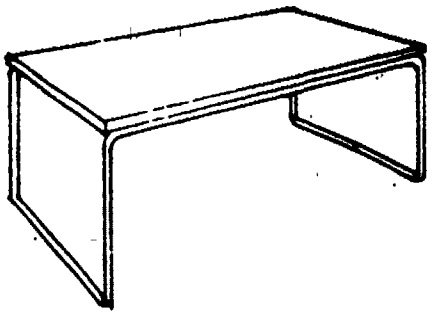
SYSTEM USED IN THE LIBRARY RESOURCE CENTRE



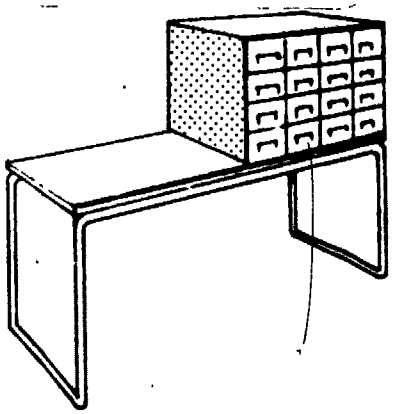
163 _ CHARGING DESK



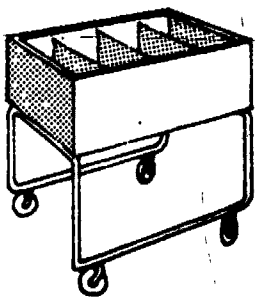
120_ ADJUSTABLE HEIGHT TABLE



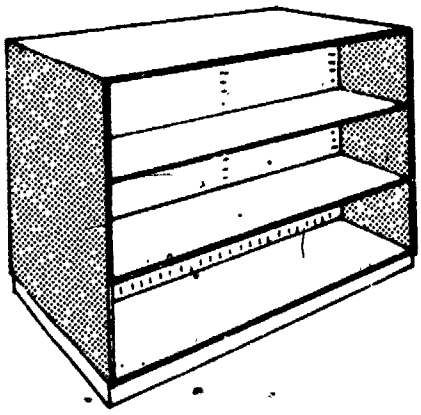
137 _ FIXED HEIGHT TABLE



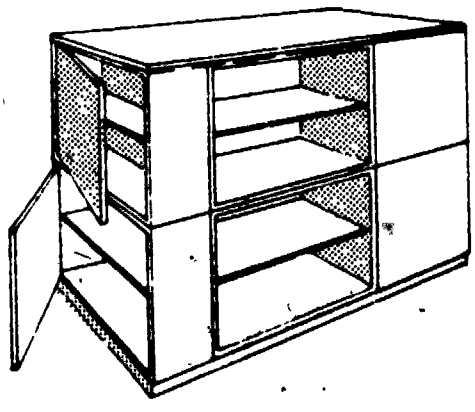
164 _ CARD CATALOGUE UNIT



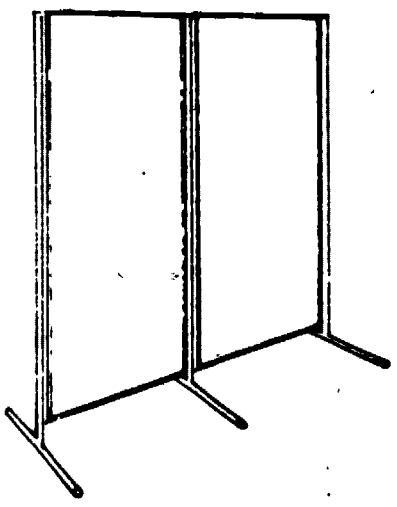
90 _ STORAGE CART



83 a _ DOUBLE SIDED BOOK SHELVING



41 _ GENERAL STORAGE



111_ VERTICAL PANEL DIVIDERS