

# FLEXIBLE SPACES IN SCHOOL DESIGN (II)

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6.

## FLEXIBLE GENERAL SPACES

In modern school design the major consideration for the provision of general facilities is the flexibility of spaces for possible multiple uses. Generally, the major facilities besides classrooms are library, gymnasium, lunchroom or cafeteria, and auditorium. These facilities are individually and collectively the most expensive areas of the modern school, although spaces like auditoriums are normally used for less than 10% of the time. These spaces, if designed traditionally, are especially impractical for multiple use. They can be utilized economically under a suitable arrangement by omitting or combining a number of functions together, by using them as teaching space or community space when they are not in use for the original function,

The problem dealt with here is to find the best combination of uses so that multiple use of space can be provided without restriction of the educational program.

In this chapter, it will discuss the possible flexibility of these functions and give some examples which already have been adopted by certain schools.

## 6.1 GYMNASIUM

A gymnasium is a space for physical education, athletic and community use. In order to economize facilities in school, this space sometimes can be adapted as an auditorium. However, the following conflict then will be come unavoidable.

When the stage is attached to the gymnasium, there is always a conflict of interest between the dramatics teacher and the sports coach, as both of them usually need to use the space at the same time, and scheduling conflicts between athletics and other public performances will be inevitable. Futhermore, many school administrators find it diffecult to use the gymnasium for adult programs or community activities because it is used for physical education programs most of the time.

The stage or gymnasium can be combined with a kitchen to serve as a cafeteria or lunchroom, thus forming a multiple-purpose room. However, the use of this room as an auditorium is limited by the flat floor which is not inclined as a normal auditorium to provide efficient hearing and vision to the audience.

The school may not be able to afford two separate buildings for gymnasium and other purposes of may not see any particular advantage in having two. Therefore, many schools in Britain, Canada and the United States have multiple-purpose gymnasiums as shown in Fig. 6.1, and can along nicely ((5) p.90).

With the use of some ingenuity in planning the space arrangements and the supporting auxiliaries, with some taste in the choice of building and decorative materials and efficient management, a multiple-purpose gymnasium can achieve many purposes

and a great deal of money saving.

If and when the school grows and the time comes when it is possible to add a small auditorium or theater, the gymnasium will become available for full-time physical recreation.

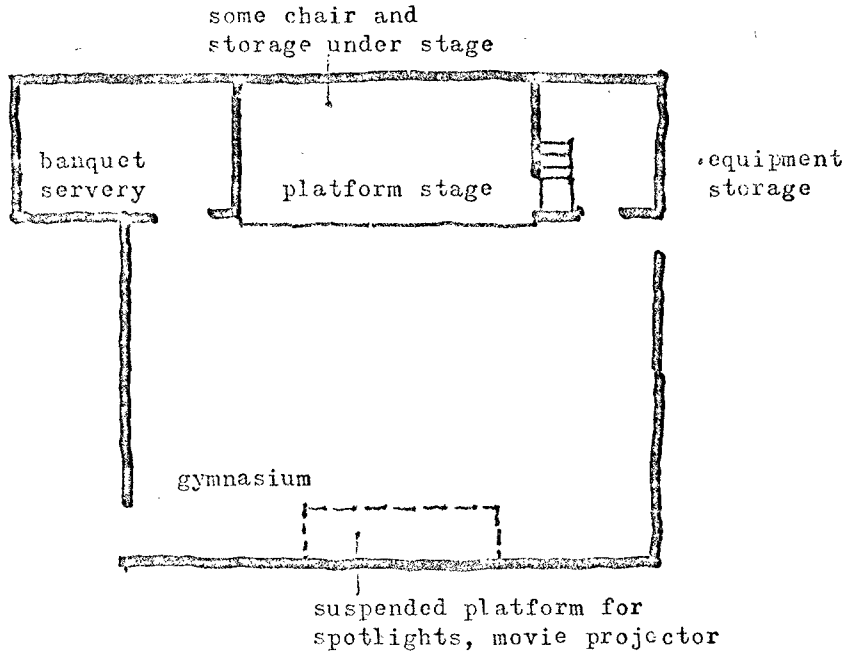


Fig. 6.1 A Multi-Purpose Gymnasium Used as Auditorium, Banquet Hall and Ballroom

(1) As An Exhibit Area

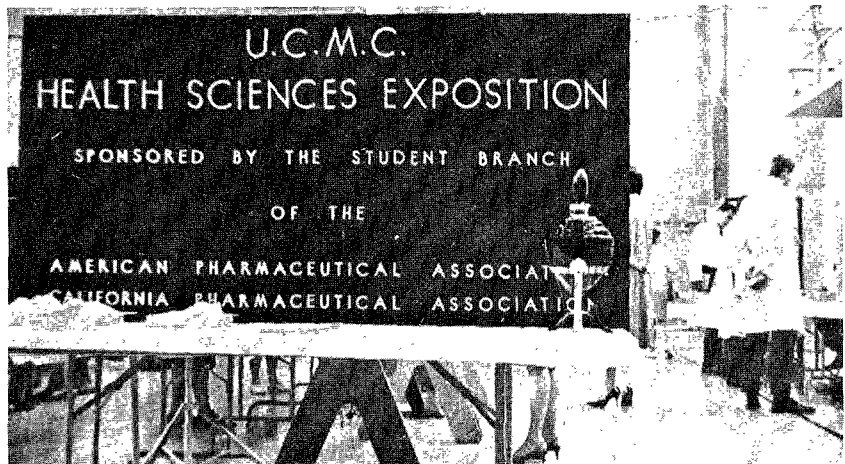
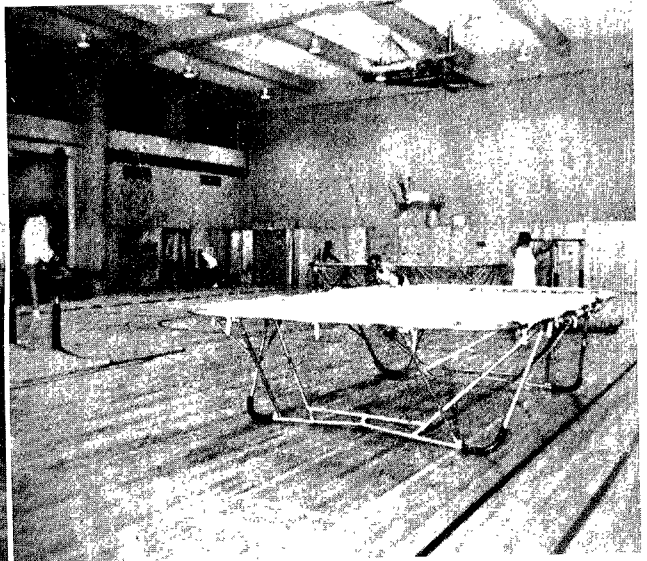


Fig. 6.2 Photographs Showing Multi-Purpose Gymnasium of Fig. 6.1

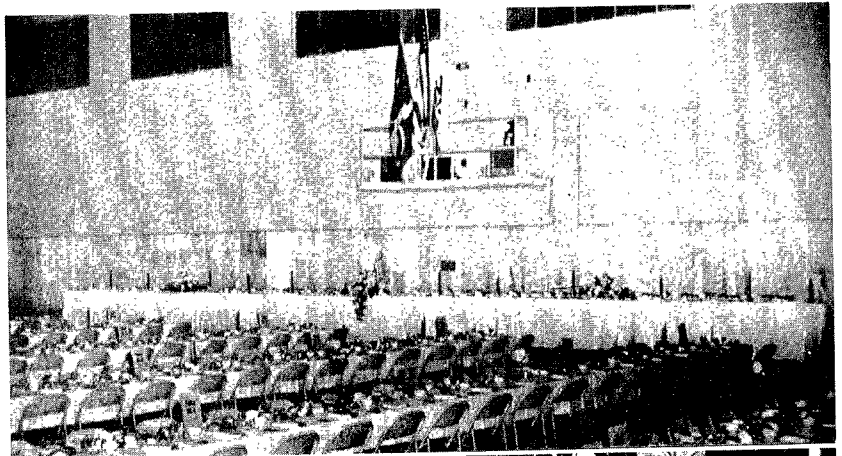


(ii) As A Ballroom



(iii) As An Exercise and Workout room, Basketball Court

(iv) As A Banquet Hall



(v) As A Noon-time Center for Programmed Entertainment

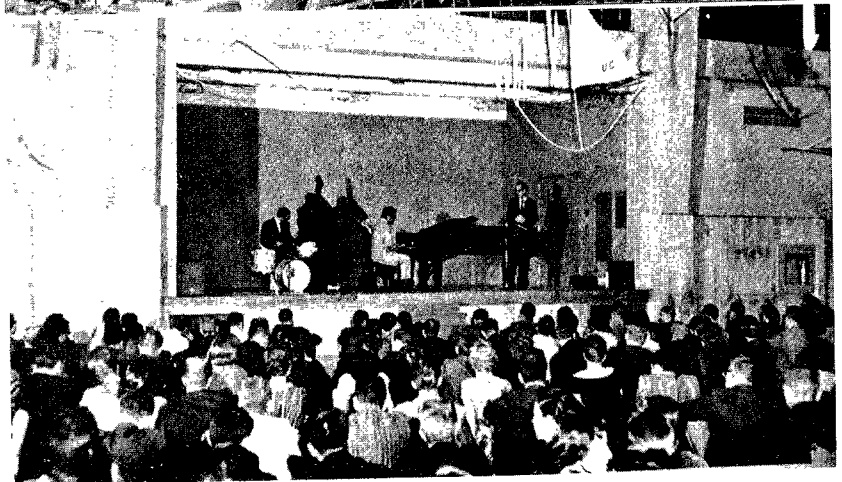


Fig. 6.2 Photographs Showing Multi-purpose Gymnasium of Fig. 6.1 (cont.)

## 6.2 CAFETERIA / CAFETORIUM

For the efficient use of space, a cafeteria may be built with the following flexibilities: (3) (5) (14)

- a. As a place to accommodate different groups for lecture, demonstration, televised and visualized instruction.
- b. As a multi-purpose area.
- c. As a meeting room after the meal hours.
- d. As study rooms during exam periods, with coffee conveniently provided.
- e. For bridge parties, which can also use the refreshments nearby (self-service) without special catering arrangements and extra expenditure.
- f. As a place to accommodate a visiting group of school children who need to assemble at lunch time.
- g. As a place to provide television and other visual programs (e.g. the world series of sports) for those who wish to watch while they eat.

However, this place can not be used as the reading area of the library or combined with the library in some other ways, since books can be easily contaminated with foods.

To build additional flexibility into the cafeteria to ease its peak loads or to provide for periodic special needs, it is useful to have two or three smaller meeting rooms next to the cafeteria ((5) p.63). When thus planned, the meeting rooms can then be used to:

- a. provide additional seating space in the cafeteria

- during peak hours.
- b. function as a reception area and refreshment center when the cafeteria is used for parties and banquets,
  - c. provide the storage space when the cafeteria is partly or entirely cleared for a dancing party,
  - d. serve as meeting rooms after meal hours.

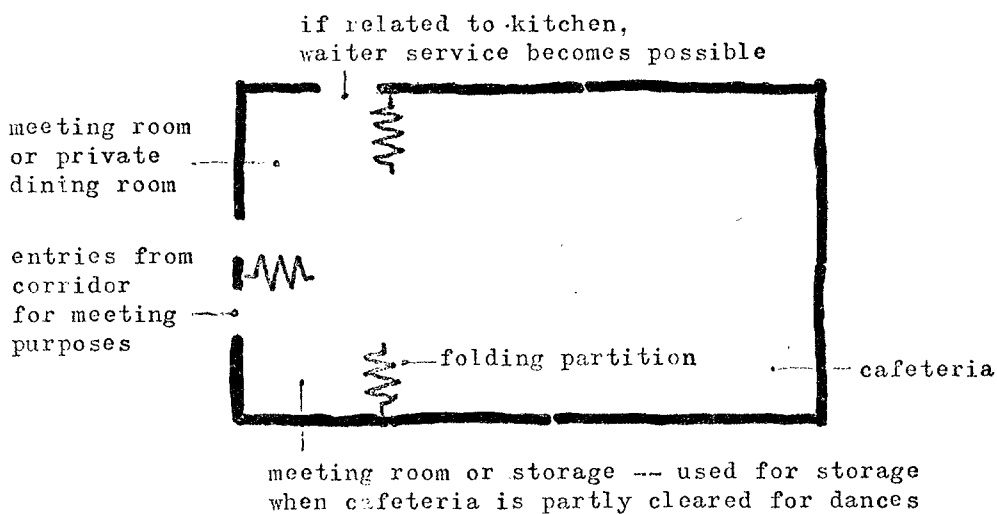
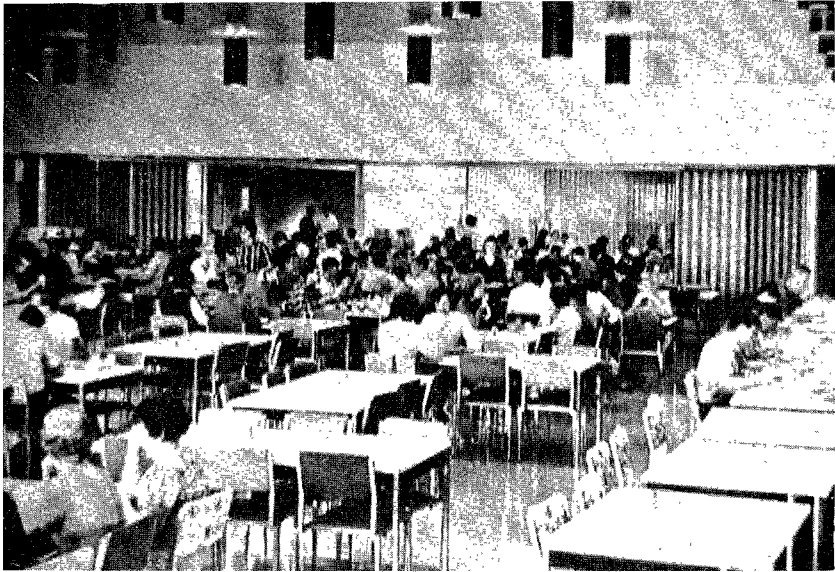


Fig. 6.3 A Cafeteria Combined with Meeting Rooms to Accommodate The Noon-Time Peak Load

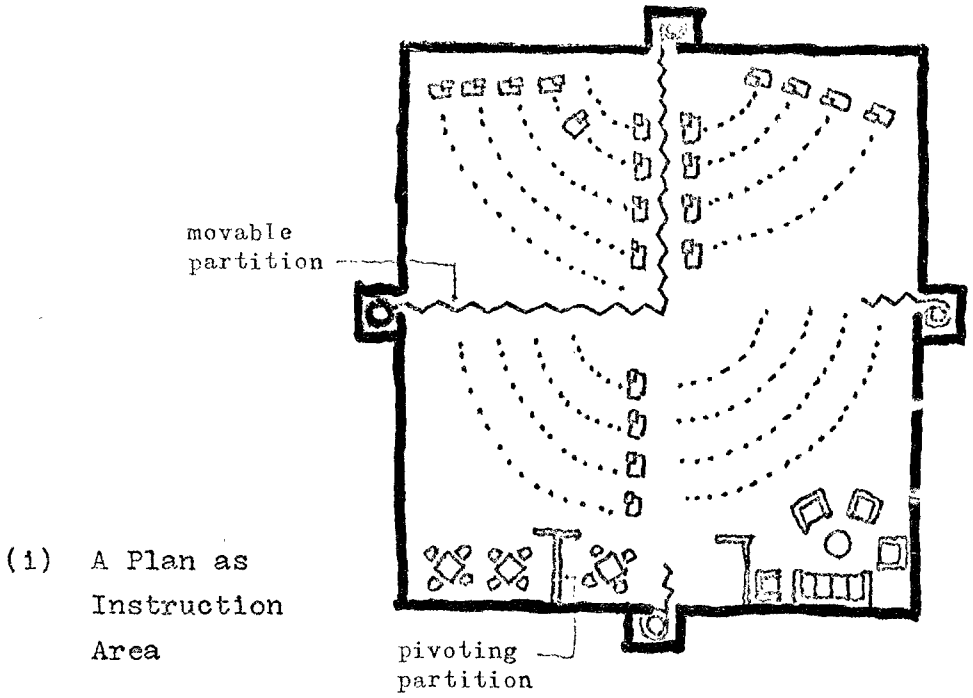
Auditorium and cafeteria are now combined as a CAFETORIUM in many new elementary schools. When specially planned to serve these two compatible functions as well as for large group instruction, such space can be very economical in a small school. ((3) p.15)

As shown in the sketches, (Fig. 6.5) the large area is divided by a folding partition so that they can be used separately or together. Variation in the seating arrangements can be provide by multi-purpose furniture that can be grouped for dining purpose or rearranged as individual units with writing surfaces.

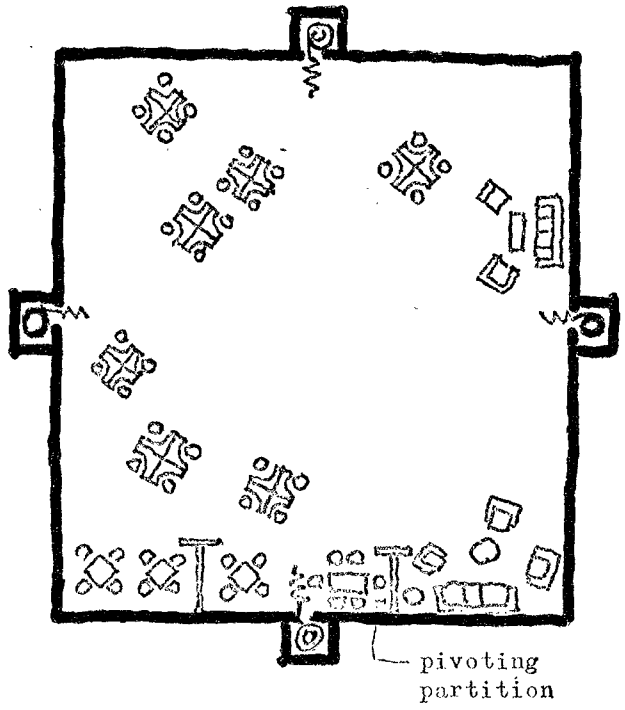


two open-or-closed private dining areas lie between its cafeteria and snack bar so people could enter from either side (when used for privat group lunches) or added to either seating area at peak periods, as needed.

Fig. 6.4 Photographs Showing The Plan of Fig. 6.3



(1) A Plan as Instruction Area



(11) A Plan as Cafeteria

Fig. 6.5 A Scheme of Cafetorium



Small spaces around the perimeter of the rooms provide informal dining areas as well as spaces for study, counselling, or conferences.

Food service could be provided from one of the main rooms behind an acoustic partition to prevent the kitchen noise from intruding the adjoining study room.

With the addition of a movable stage, such space can also be used for little-theater activities, social meetings after school, etc. Where possible, these areas should be accessible from the outdoor court areas equipped with tables and chairs for both dining and class meeting. ((3) p.74)

### 6.3 AUDITORIUM

An auditorium is a room or building to accommodate an audience for lecture and performance.

A small school seldom can afford an auditorium. Although a big school frequently can afford an auditorium, it seems wasteful to use it for only once a month or so. Therefore, there is a trend to combine a number of functions such as teaching, gymnastics, community activities or snack areas, etc. with this facility.

Several possible combinations of functions in an auditorium are discussed as follows:

#### (1) All-Purpose Auditorium

All-purpose auditorium is equivalent to the multi-purpose auditorium. It is, namely, an auditorium that can function as theater and concert hall, or theater, concert, and lecture

hall, as many schools cannot afford the luxury of separate buildings for each of these purposes. For those schools which cannot afford much money, the multi-purpose auditorium that can accommodate all the above uses may even become a fine-arts center within their fiscal range. However, to make such a facility into a workable unit would require design techniques of a special nature to deal with the diversity of uses. To date, the story of most multi-purpose theater-concert halls is a disappointing one. The problem is that the auditorium ideally suited to concert performance has a shape different from normal broad, shallow one. Also, the acoustic requirement for music differs from that for oration. Thus, there is a danger that the hall intended to serve both purposes will serve neither well.

To add to these problems, there is the matter of scheduling. Conflict and frustration result when the various performing arts require the same hall for rehearsals and performances at the same time.

The unresolved problems on the multi-purpose theater or theater-auditorium are the following:

- a. which function can be satisfactorily combined and which cannot;
- b. how can one design a space to satisfy both the disparate needs of concert hall and theater;
- c. how can a rehearsal area be fitted in without hindering the use of the space for performances, assemblies and the like;
- d. how can a hall designed for noncommercial educational theater be expanded to a size that makes road company

productions economically feasible;

- e. if a theater is to be used also for instruction, how can it be designed to serve that end as well.

Even such details as tablet-armchairs for note-taking and audio-visual equipment for instruction can present difficulties. In brief, the problem is how to design such a facility to be a many-splendored, but not a many-splintered hall.

A good example of a multi-purpose auditorium is shown in Fig. 6.6. It is a two-story and basement structure which has the main auditorium as its dominant feature, and is mechanized for quick change in form. Basically it is a straight proscenium auditorium, and its stage and seating can be converted by means of a hydraulic lift system and pivoting seat banks to accommodate a three-quarter arena stage or theater-in-the-round. The entire theater can be changed from one form to another in minutes by two operators. One lift raises the orchestra pit, large enough to hold 20 musicians, to the level of the stage (or lowers it to a basement storage room beneath the stage to bring up props). Another lift raises to the stage level a platform upon which stand the first five rows of seats. The banks of seats, pivoted on airplane wheels and fanned out, and divided into two sections, one to the left and one to right side of the hall, thus creating a horseshoe-shaped seating arrangement. The platform vacated by the seats is joined to the platform of the raised orchestra pit to form a stage apron which is thrust forward into the house to form a three-quarter arena stage or theater-in-the-round. For the latter, portable chairs are placed on the back of the stage behind the proscenium. ((10) p.9-10)

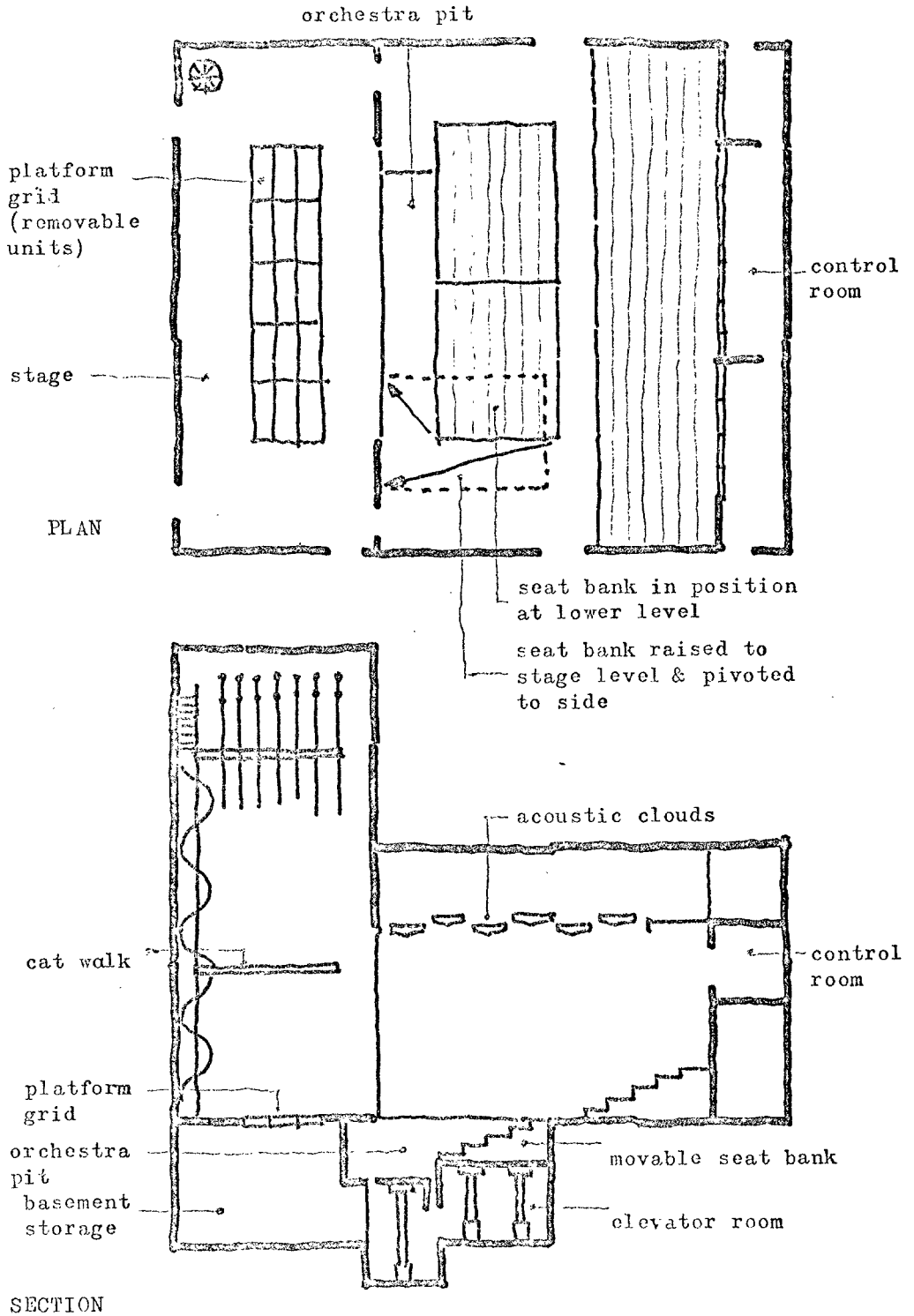


Fig. 6.6 Convertible Auditorium in Two of Its Possible Forms

## (2) Divisible Auditorium

There are two possible ways to design a divisible auditorium. One is to build an ordinary auditorium and use movable walls to divide it into several teaching spaces when required. The second solution is to combine several regular classrooms into a small auditorium. This arrangement permits the use of these classrooms as teaching stations at normal times, but still leaves the stage available for rehearsals when needed. Furthermore, the stage can be used during normal time as a space for instruction. In order that these rooms can be effectively combined to form an auditorium, it would be necessary to have movable furniture in them so that they could be moved out of the way to allow for the seating up of folding chairs for the auditorium.

Where a hall must be subdivided, it is necessary to ensure of effective sound insulation between the spaces separated by operable walls. In general, effective sound insulation can be readily provided by a double wall system. ((7) p.37)

### a. Division by Iron Curtain

A good example of a divisible auditorium is shown in the following sketch (Fig. 6.7). This auditorium is usable simultaneously for a combination of multiple-functions through the use of operable walls and changeable acoustics. Its size, shape and sound quality can be altered to suit every function.

This auditorium has three movable walls. When it is used for commercial theater or opera, school commencement ceremony and other celebrations, the hall retains its basic shape. When it is used as a music hall in a less formal nature, two

operable walls on opposite sides of the auditorium can be closed. With the walls closed the hall assumes a relatively long, narrow shape best suited to concerts and recitals, and it allows for the simultaneous use of the two side spaces isolated from the auditorium proper as lecture rooms. When it is used as an intimate educational theater, the back of the auditorium can be cut off by a third operable wall so that the hall is converted into a broad, shallow-shape. In the last form, the area cut off from the back of the house by the drawn wall becomes a third lecture room.

The stage of the theater is convertible by means of a hydraulic lift system. Acoustics are also adjustable. Absorbent fabric can be drawn across the hard-surface walls to get different reverberation when it is used differently for music and oration. Operable walls are made of solid steel, which has a unit mass of 25 lbs per square foot. Garaged horizontally, with the upper half in the ceiling and the lower half in the floor, they have only one seam where they meet in the middle, which can be made airtight with a resilient beryllium copper compression seal that can be squeezed hard and will spring back into shape. Beryllium copper seal also are provided around all four sides of the partitions. Sound attenuation is expected to be superior to anything now in existence. Operation of the walls could be mechanically simple in spite of their great weight. A rigging system can be used to counterbalance the two halves of the partition so that only a 3/4-hp motor will be required to move them. ((7) p.26, (10) p. 21-25)

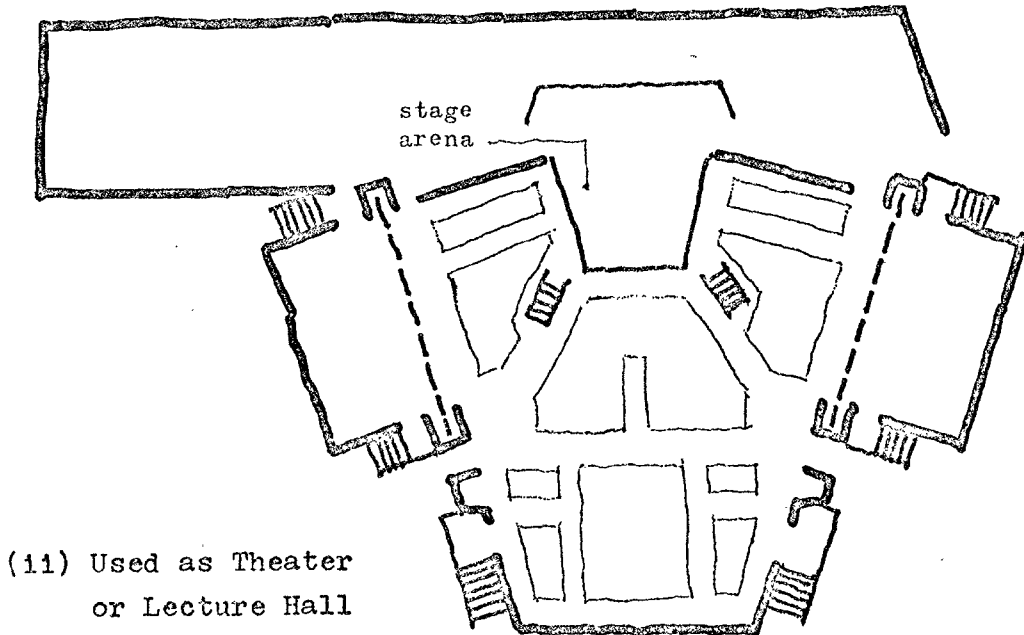
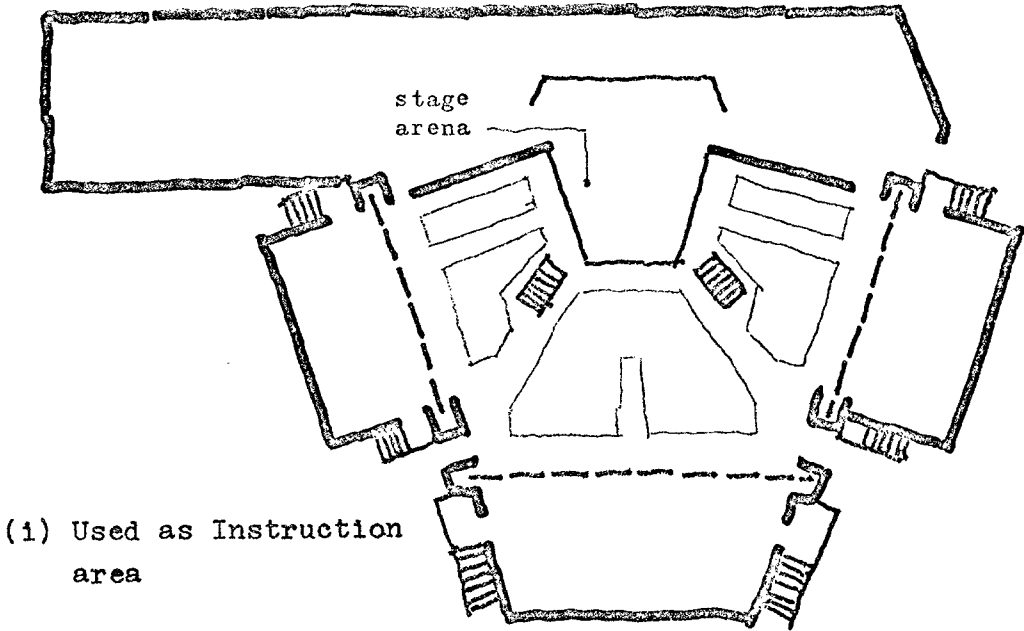


Fig. 6.6 A Divisible Auditorium Divided by Operable Curtain

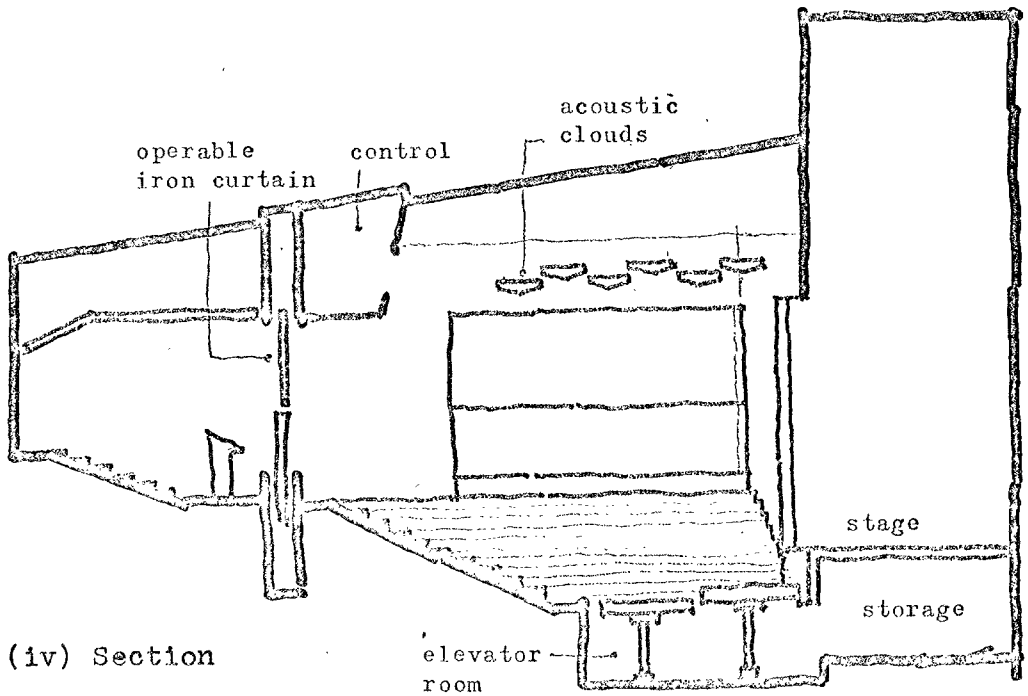
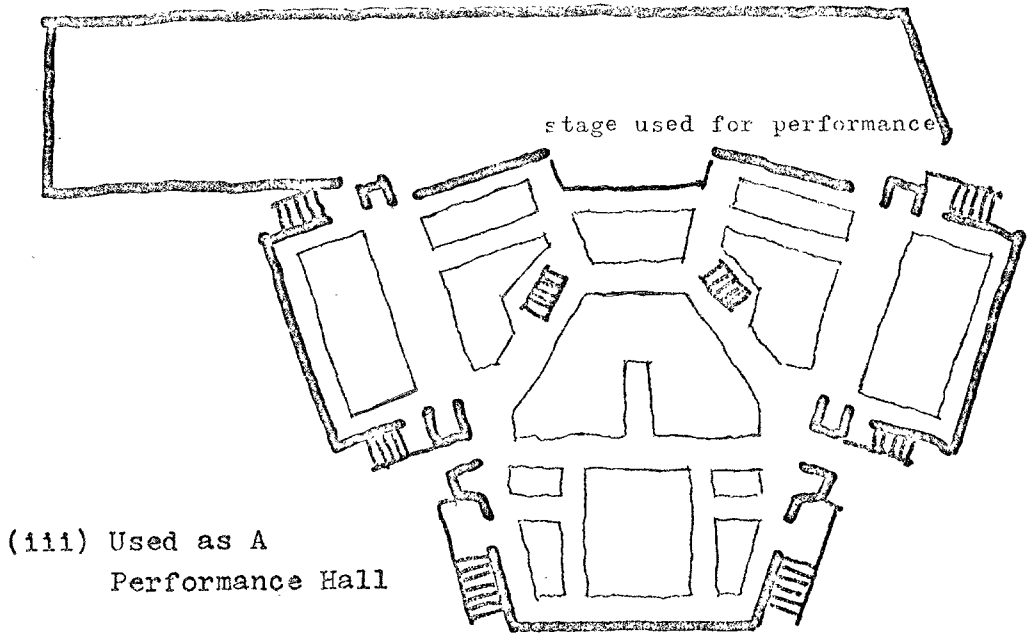


Fig. 6.6 A Divisible Auditorium Divided by Operable Curtain (cont.)



#### b. Division by Operable Coil Wall

A good example of a flexible auditorium adapting well with coil wall is shown in the sketch (Fig. 6.8) below:

This auditorium of 600 seats capacity was planned to provide instructional facilities, with heavy emphasis on the use of audio-visual methods, and has only limited provision for theatrical or musical events. The audio-visual emphasis is reflected in the shape of the auditorium and in the spaces created when it is divided by the operable partitions. The three teaching areas, one for 300 students and two for 150 each, in the auditorium are wedge shaped, thus providing ideal sight lines for audio-visual presentations. The divided lecture halls are relatively shallow so that projected images can be read by students in the last row.

Rear projection is employed as this is regarded to be preferable for instructional purposes since some lights can be left on for note-taking.

In order to avoid the trouble of cutting out the bottom of the partitions to fit the steps, a low dwarf wall is built to provide a level track for the partitions even though the auditorium floor is sloping. Each of the two partitions consists of two parts: one divides the stage, and the other divides the auditorium proper. Both sections are moved into garages at the backstage and rear of the hall to open up the auditorium. Movement of the partitions is accomplished by mechanical and electrical means. ((?) p.13)

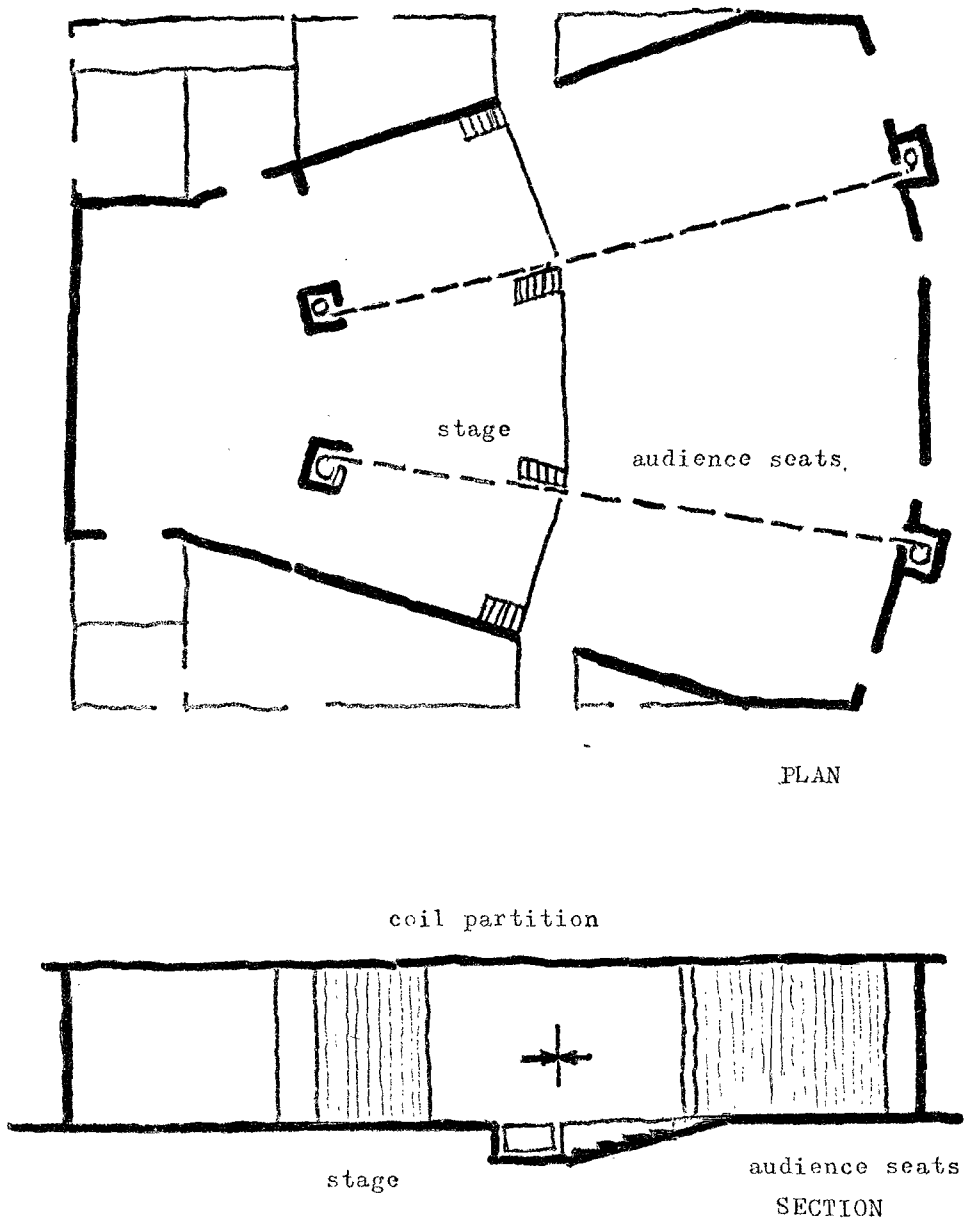


Fig. 6.8 A Divisible Auditorium by Coil Partition

Another example of an auditorium divided by coil wall is shown below (Fig. 6.9):

The use of coil-wall rolling partitions divides the auditorium into three self-contained areas in a matter of minutes, thus very satisfying the need for lecture halls. ((8) p.56)

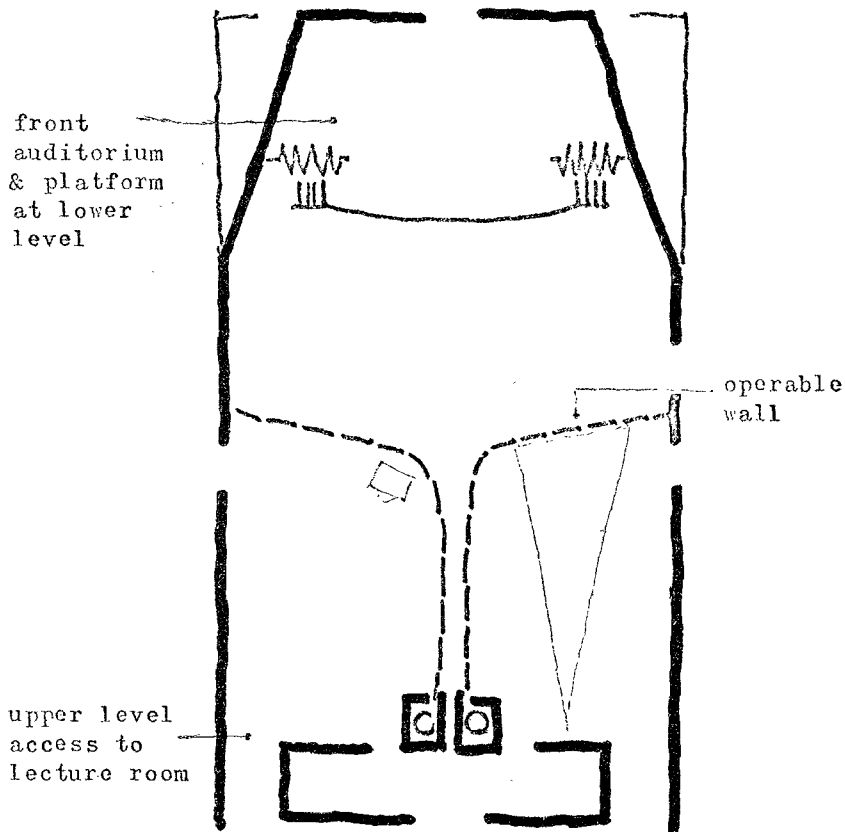
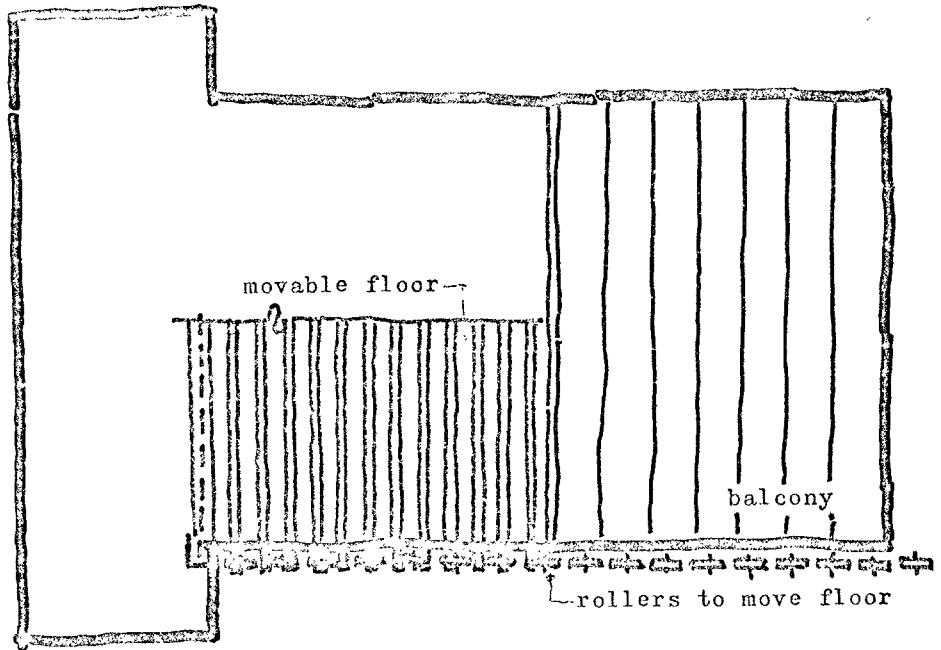


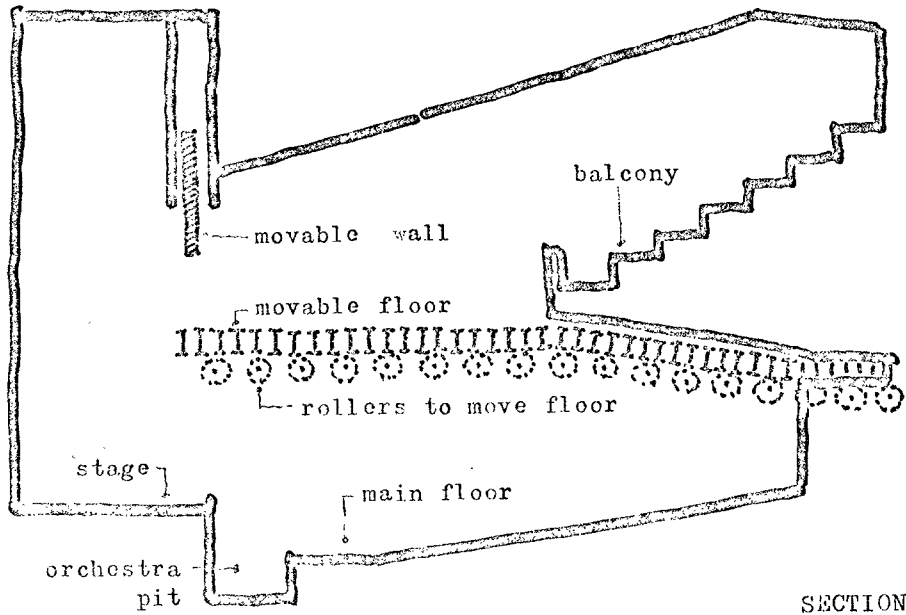
Fig. 6.9 A divisible Auditorium Divided by Operable Coil Partition

#### c. Division by a Movable Floor

An auditorium or a theater with balcony can be divided in several ways as mentioned above. Most of the facilities, such



PLAN



SECTION

Fig. 6.10 A Proposed Auditorium Divisible by Movable Floor

as movable partitions and operable walls, are used in dividing a space with a limited ceiling height. However, the huge space at the top, from the front edge of the balcony to the stage would seem wasteful. In order to make the top space useful, a concept of building a movable floor to divide the huge space from the main floor to the balcony into two usable spaces has been investigated by this author.

The sketch Fig. 6.10 shows the concept of a movable floor, which can be used for rectangular space only, because of the limited support and span of the floor.

### (3) Auditorium and Gymnasium Combination

Auditorium for 150 or more students are most oftenly combined with gymnasium in the elementary school, so that it can be used on days when the weather does not permit use of the outdoor playground. To serve this dual purpose, the floor is generally flat and ceiling is high, the seating is movable, often is the folding type, but is seldom comfortable. The general evaluation is that such space rarely serves either function well, since it is designed specifically for neither. ((3) p.15). In addition, attention must be paid to provide adequate ventilation as it is inevitable to have odors arising from a gymnasium.

Instead of combining the auditorium and gymnasium together, probably it is wiser to put them adjacent to each other. A good example is shown in Fig. 6.11 ((14) p.63). The pictures followed show the use of those spaces. The movable walls, constructed of heavy, soundproof material, are raised and lowered

by a hydraulic lift. The stage of the auditorium is used as a stage, an exercise room for physical education and, with movable bleachers, as seating space for spectators at athletic events. The gymnasium is used as a gymnasium and also as a spectator's area for performances on the stage that are suitable for arena productions. The auditorium is used both as an auditorium and as an instructional area for music. When physical education classes are using the stage, the bands may practice in front of the stage. Since the movable walls provide sound barriers, these two

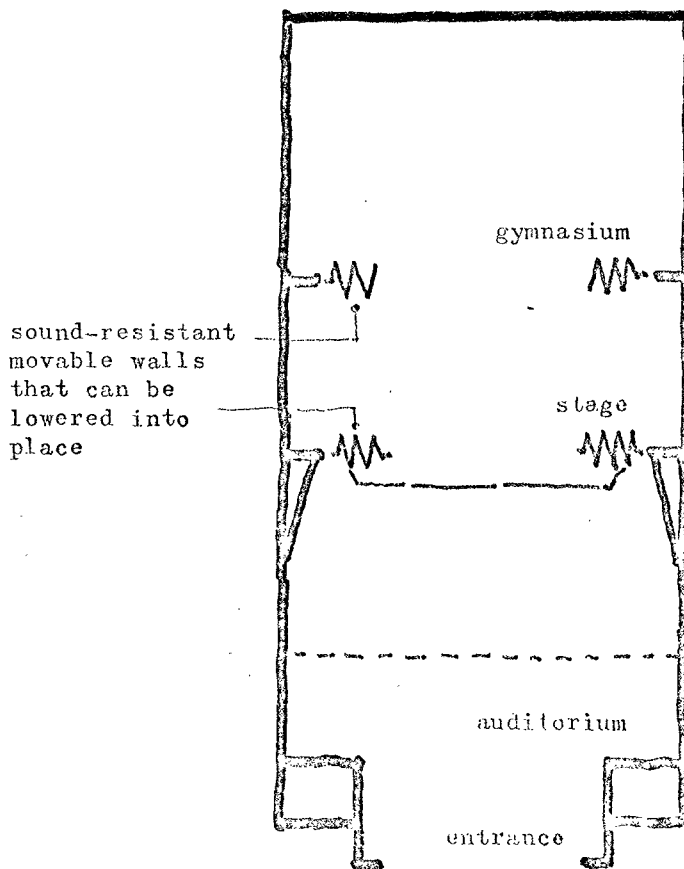
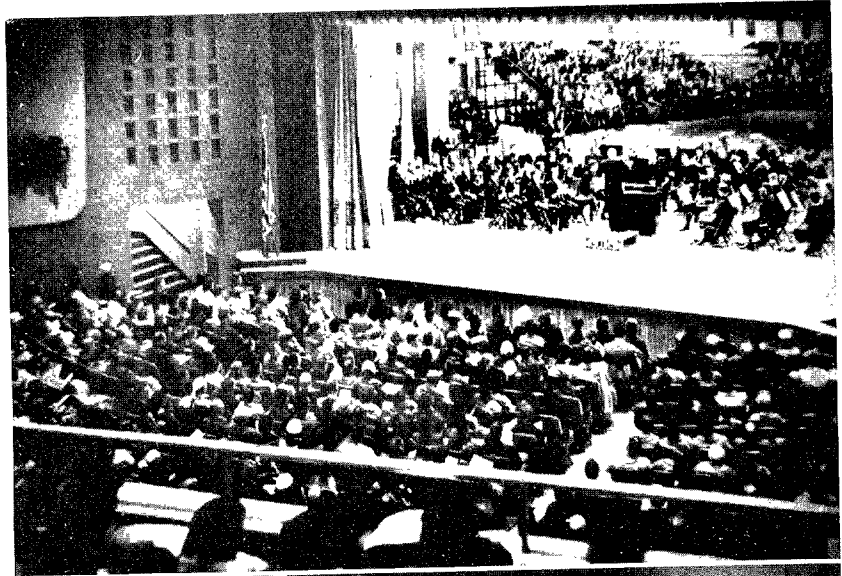
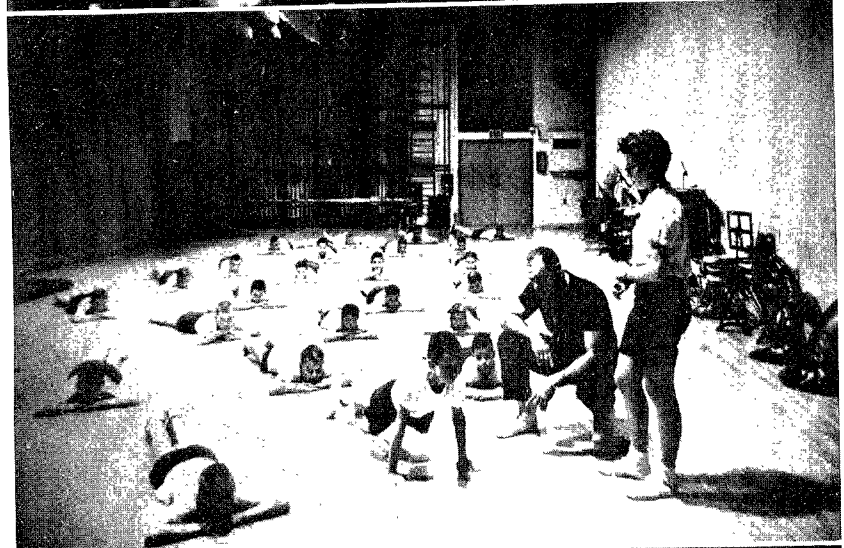


Fig. 6.11 The Multiple Use Area Formed by Combining The Auditorium and Gymnasium

(1) A Performance is hold on the stage and the gymnasium in use to seat part of the audience



(ii) A boys' physical education class is held on the stage.



(iii) The gymnasium and stage are used at an athletic event

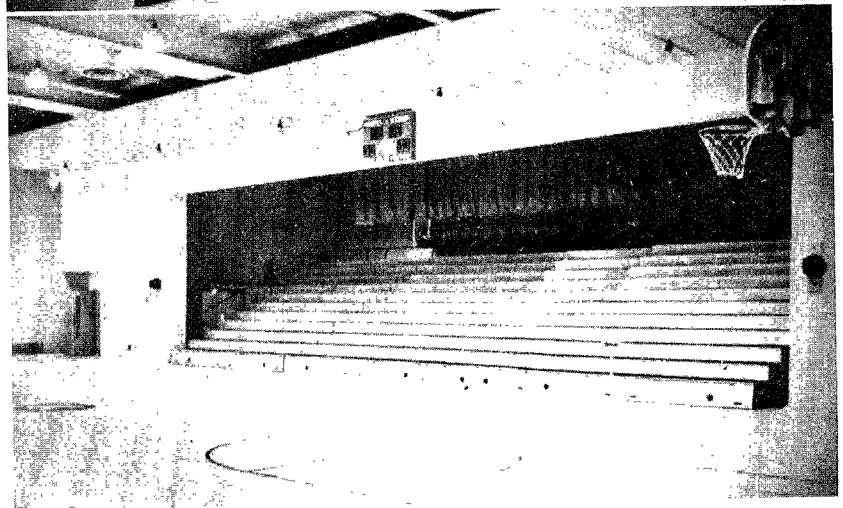


Fig. 6.12 Photographs Showing The Auditorium and Gymnasium of Fig. 6.11

activities can go on at the same time without interference.

#### (4) Auditorium and Cafeteria Combination

Cafetrium is a cafeteria that also can be arranged and used as an auditorium. The main function of this facility is cafeteria and the sub-function is auditorium.

The following is to discuss how an auditorium can be combined with a cafeteria. The sketch Fig. 6.13 shows the arrangement of this scheme. By this arrangement, the problem of seating more people in some occasions of the year can be solved easily ((14) p.61). The chief advantage of this scheme is that

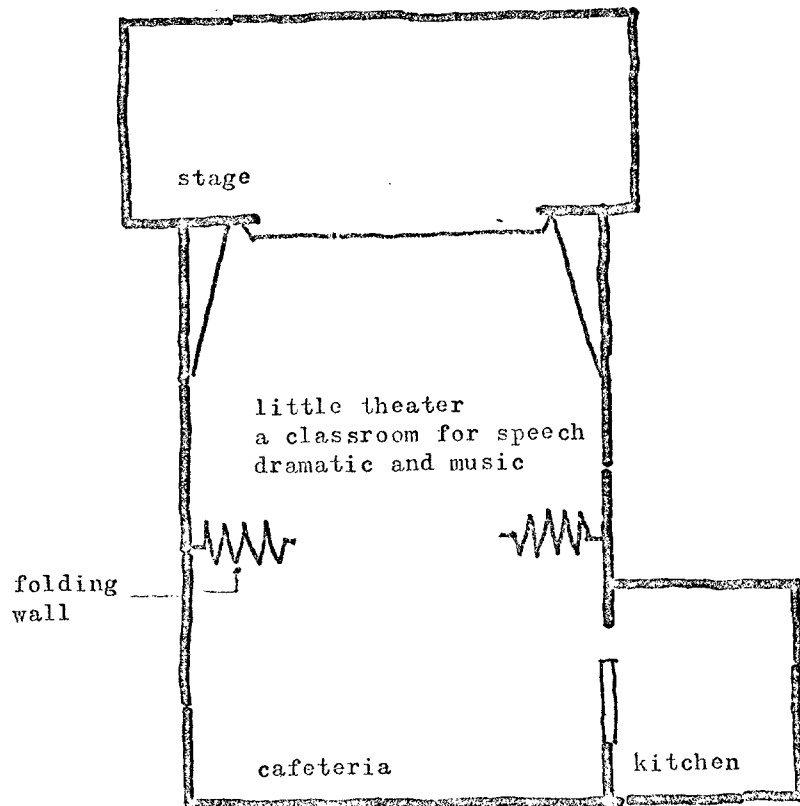


Fig. 6.13 A Little Theater-Cafeteria-Auditorium Combination



the school has a complete little theater that can be used throughout the school days as a teaching station for speech, dramatics, and vocal or instrumental music. It becomes a large auditorium by opening up the folding wall which separates the little theater from the cafeteria.

Frequently, the stage in this design is raised to provide better vision and hearing to the audience sitting at the horizontal floor, which normally can not be used as a good auditorium.

#### 6.4 LIBRARY

A library is a repository for literary and artistic materials, such as books, records, prints etc., to be kept for reading or reference. In an elementary school, it is equivalent to a resources area.

The library-resource center is the heart of the school building, both physically and philosophically. It is situated so that students naturally pass through it many times a day, by entering, leaving, or moving around the school. Readily accessible books, magazines, audio-visual and electronic resources, dictionaries, visual displays and so on, everything that the library has to offer, should be openly to invite the students to parttake at any time. It is in essence, an intellectual supermarket.

Plan of library which suits modern school requirement

can be seen from (13).

The sketch Fig. 6.14 indicates an open and flexible library. The concept of which adopted from (4) p.58 and has been improved by the author.

The library contains diverse furnishings, including carrels which students can use as thier independent study space.

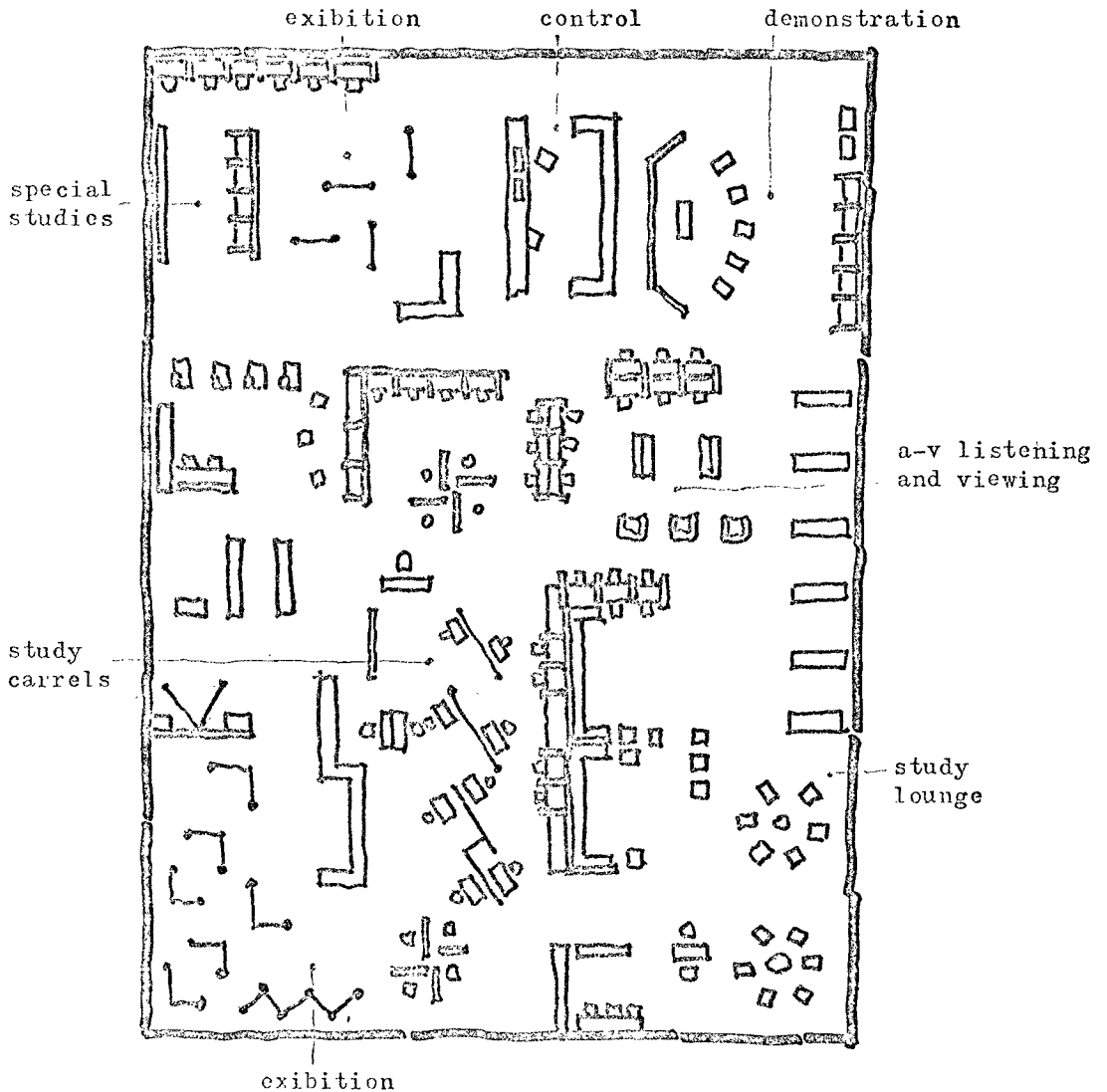


Fig. 6.14 A Flexible Arrangement of Library

A living room or study atmosphere is achieved in the library by the use of informal and comfortable materials and fabrics on walls and floors, spread lounge chairs and work tables in open arrangements and the provision of variety in the atmosphere.

Display space in the library is used to help make the school a link or connection of the best works by other men's minds and hands, as well as the display of projects by the school's students.

#### 6.5 THE COMMONS

The commons area is an ordinary space without any special characteristics, and is usually a wide hall or a corridor.

The commons area can, at various times, serve as a milling area for students who are waiting for the school bus, a place for student dances and parties, a space for student and adult meetings, a lobby for the gymnasium and auditorium, a library reading area, and a place for small groups to work outside of the classroom under supervision.

##### (1) Commons and Library Combination

The library of the school can be located adjacent to a commons room, so that the latter can be used as a reading room if the school budget is limited. Such a plan also prevents the library from becoming an auxiliary classroom or study hall. Furthermore, this arrangement would facilitate community use of

the library as there would be ample reading space in the adjacent commons.

(2) Commons and Lunchroom Combination

Another flexible use of space that seems reasonable in a modern school is to combine the area normally used for lunchroom with the space usually taken up by the corridors or the commons area, to form a larger open area that will accommodate a multitude of activities.

In this combination, food odors must be prevented from permeating the commons area except when lunch is being served. The furniture should be stackable so that it could be easily moved to clear an area suitable for dancing or other large group activities.

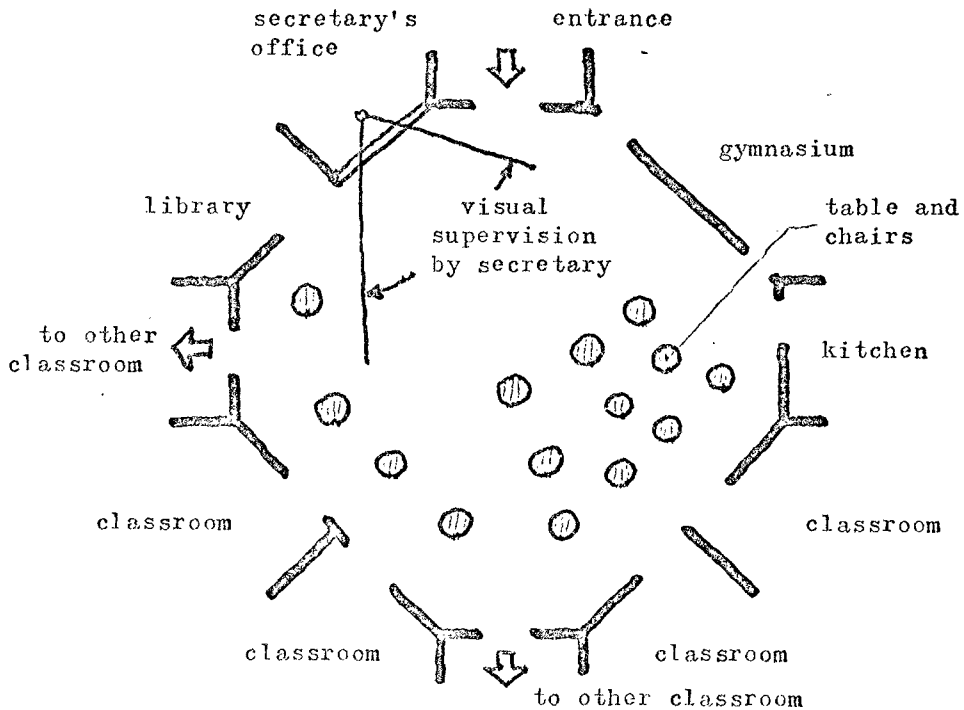
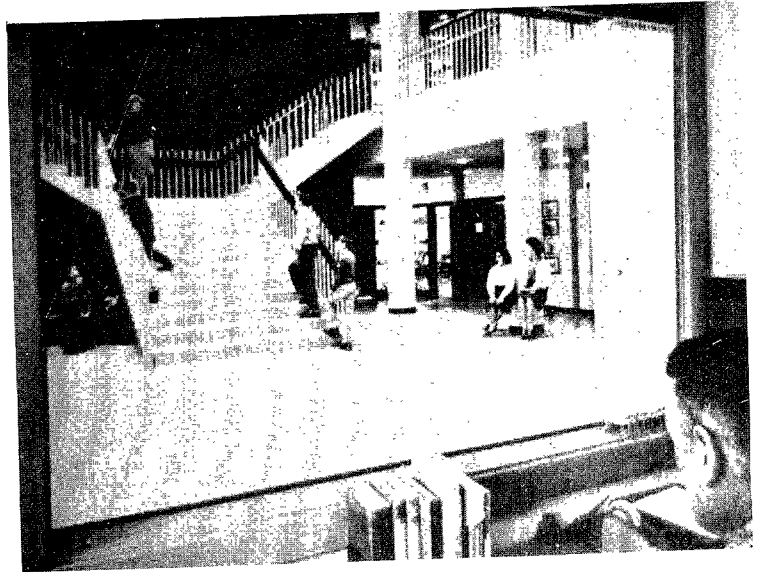


Fig. 6.15 A Scheme for A Commons Area to Serve A Number Functions of

(i) The Commons  
viewed from the  
secretary's  
office.



(ii) A Vocal Group  
Practicing

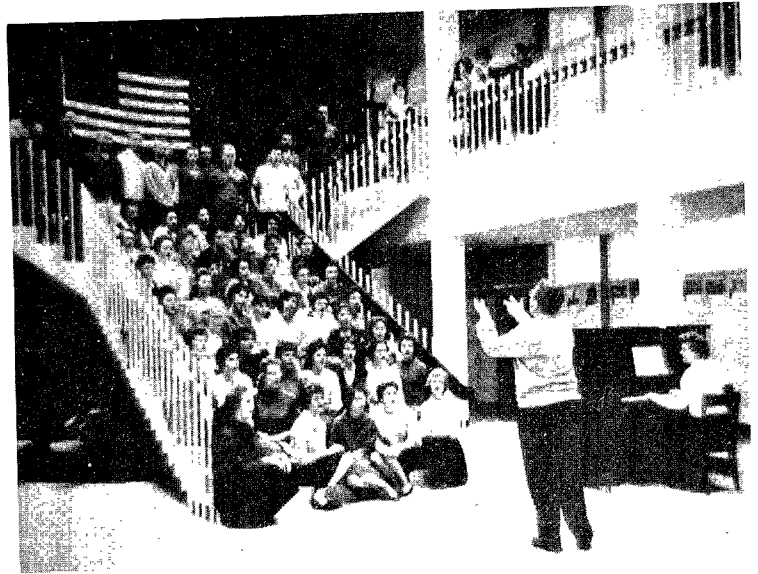


Fig. 6.16 Photographs Showing The Commons of Fig. 6.15

A good example of a well-used commons area is shown by the sketch Fig. 6.15. Although it is not combined with the lunch-room or the library, it does serve many of the other functions mentioned above. ((14) p.65)

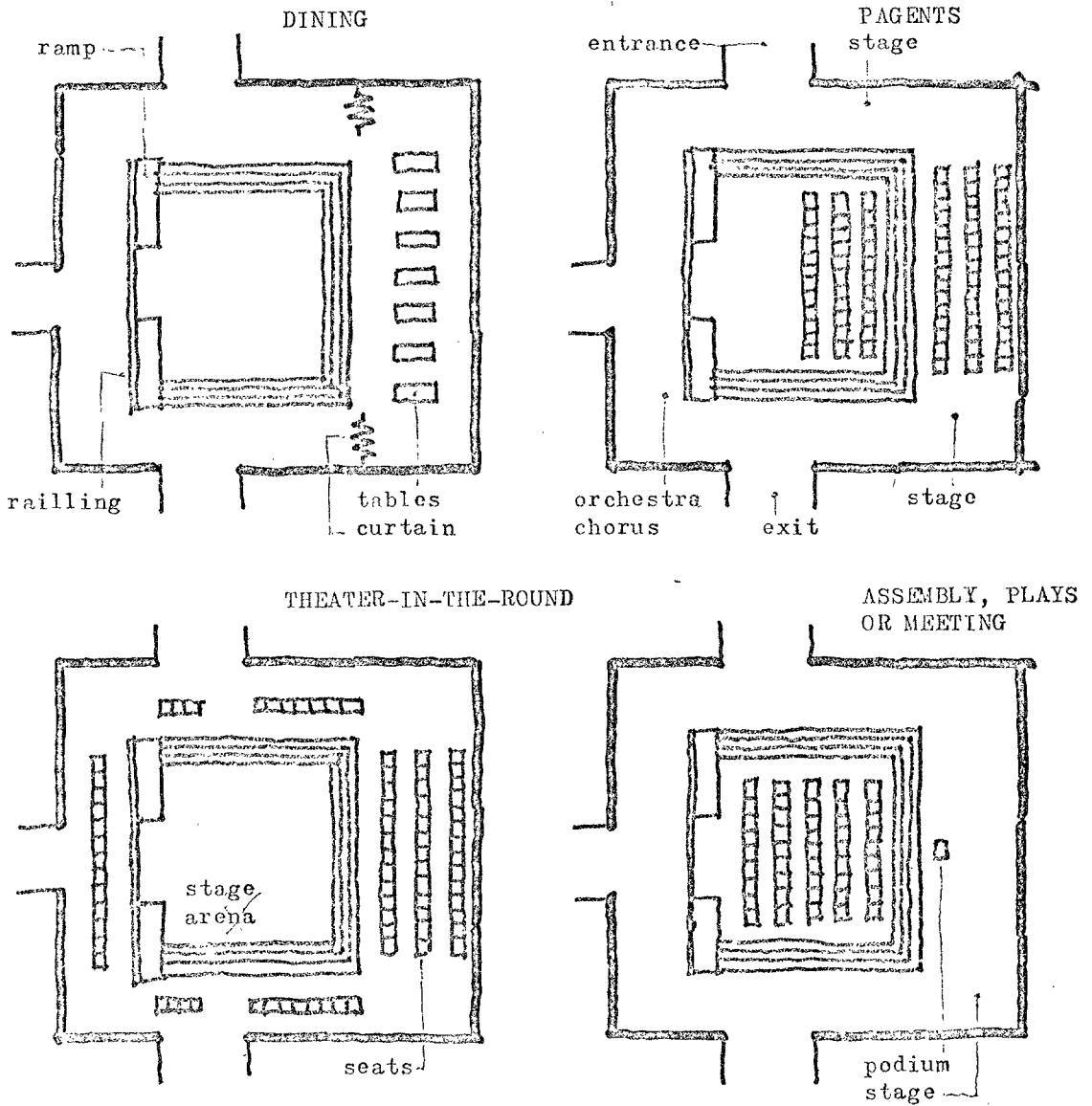


Fig. 6.17 A Scheme of Multiple-Use Commons Area

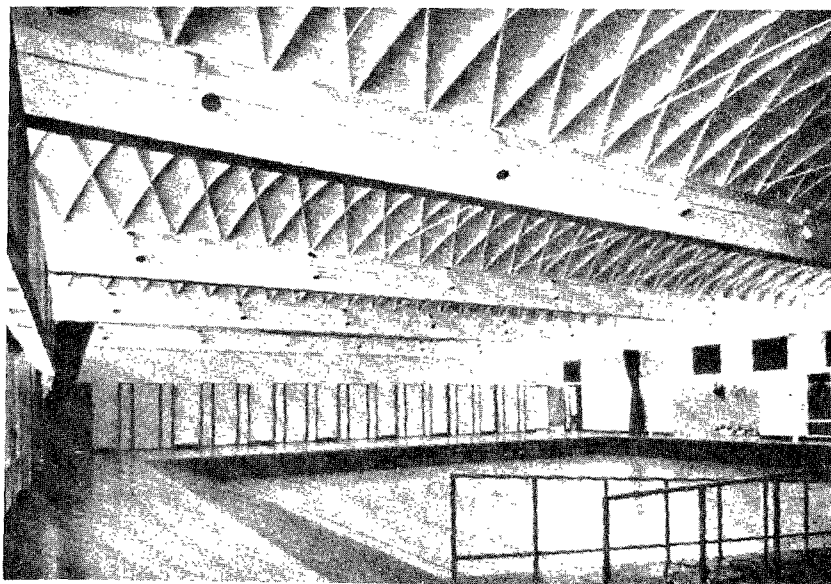


Fig. 6.18 Photograph Showing The Plan of Fig. 6.17

There is another type of multiple-use commons which shows good effect. The central commons room serves during the day as gymnasium, auditorium, playroom, dining room, project area, or display area. After hours, it is a community area. Along the main girders there are plug-in strips to accommodate whatever lighting fixtures desired, as well as curtain tracks. Some arrangements are suggested by the sketch plans. (Fig. 6.17). To appreciate it fully, one should see the children sitting on its steps, walking on errands down the side aisles, using the ramp, playing, working, or engaging in the great experience of becoming part of a world much tasteful than their home of classroom.

((23) p.153)

Another example is shown as illustrated in Fig. 6.19 The commons place is used as drama performance facility. ((21) p.13)

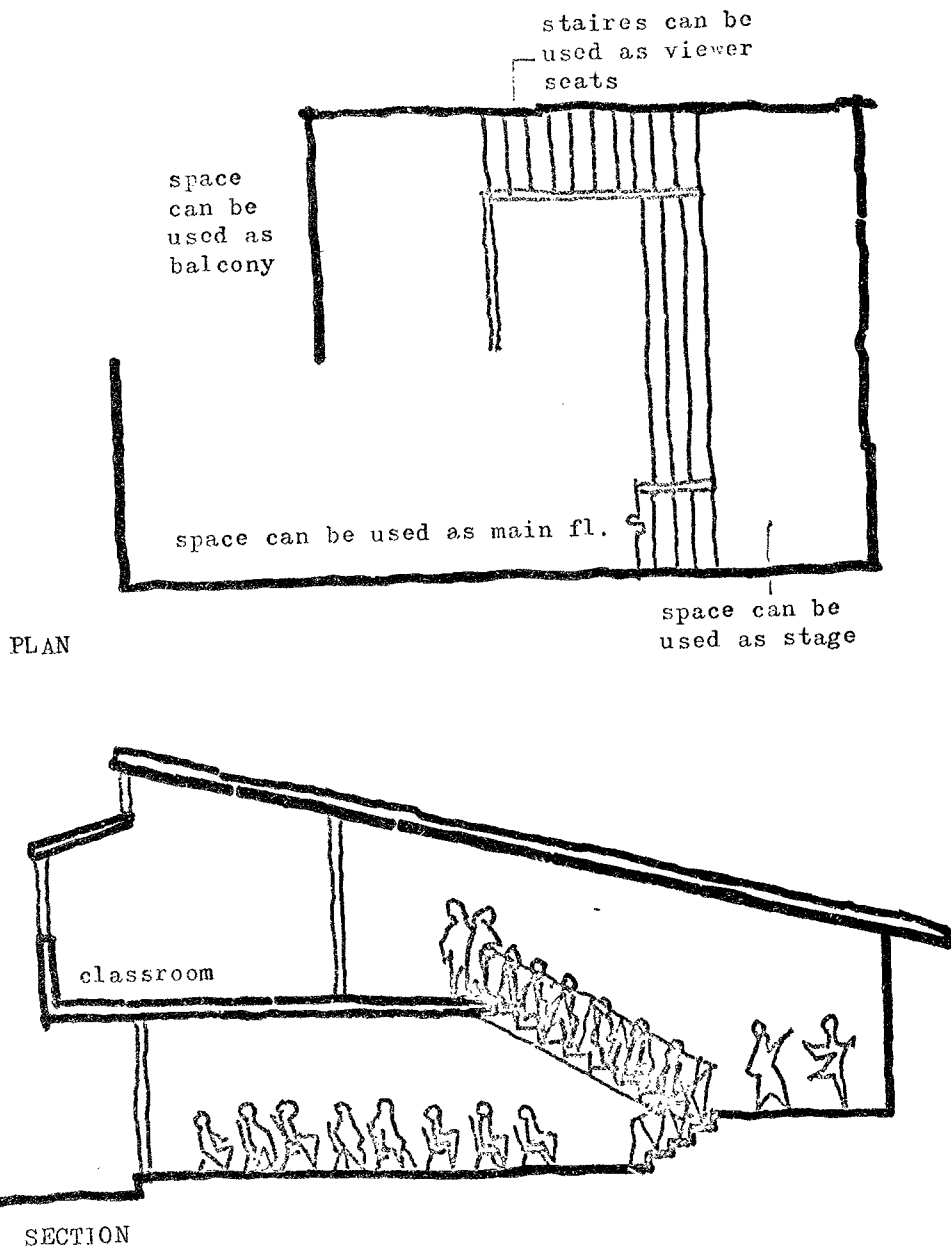


Fig. 6.19 The Commons Used as Drama Performance Facility



7.

FLEXIBLE SPACES IN ADMINISTRATIVE  
AREA

Besides the theoretical and philosophical changes indicated previously, the school should undergo changes in the administrative area as well.

An administrative area usually includes a secretarial office or work area, principal's office, a superintendent's office, guidance office, conference room for students and for school board meetings, teacher's workroom and rest area, a health center and a storage space to allow the administrator and guidance counselor to work effectively. But such facilities require considerable space which is often inefficiently used.

So, flexible features should be provided in this area to suit the future changes and to have space effectively and economically used. The following items are advisable to solve the above mentioned aspects:

- a. To leave the office area an open space, and to use movable furniture as the division of the space.
- b. To conserve a certain amount of space for flexible or multiple use.
- c. To combine more than two functions to one space.

- d. To make the private office occupy the least space and to use changeable and adjustable partitions which can be easily rearranged when needed.

To bring forth flexibility in the administration area, the following features are brought to attention:

### 7.1 OFFICE

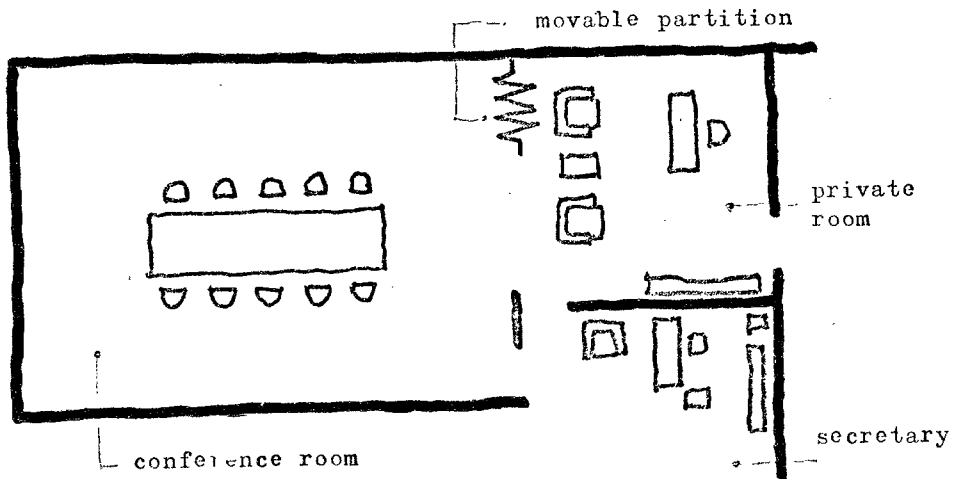
Office is a place where services, clerical work, duties such as registration and records of students, accounting, preparation of teaching etc. are carried out. Generally it is where all administrative work is conducted.

Office can be subdivided into private office and general office. Private office is mostly occupied for more important purposes such as superintendent's office, principal's office, etc.

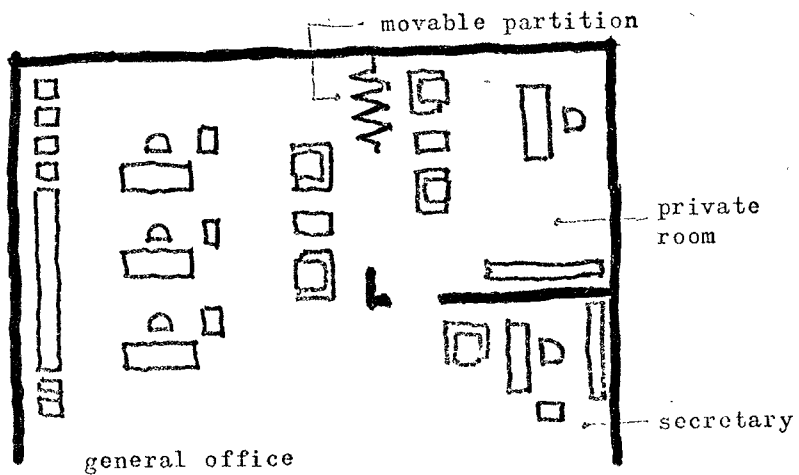
Occasionally there is not enough space in private office for accomodation when there is a community visiting the principal or an informal meeting or discussion held in the principal's room. The adjustable partitions then become useful and the room can be expanded by extending these partitions into the general office or conference room.

The sketch on next page (Fig. 7.1) shows this arrangement.

A general office should be an open space in school to suit the future change. Furniture should be flexibly arranged by using shelves, filing cabinets etc. to divide spaces. The



(i) A Private Office Combined with A Conference Room



(ii) A Private Office Combined with A General Office

Fig. 7.1 Schemes of Private Office Arrangement

following sketch (Fig. 7.2), which is not a real example, shows an idea of this approach.

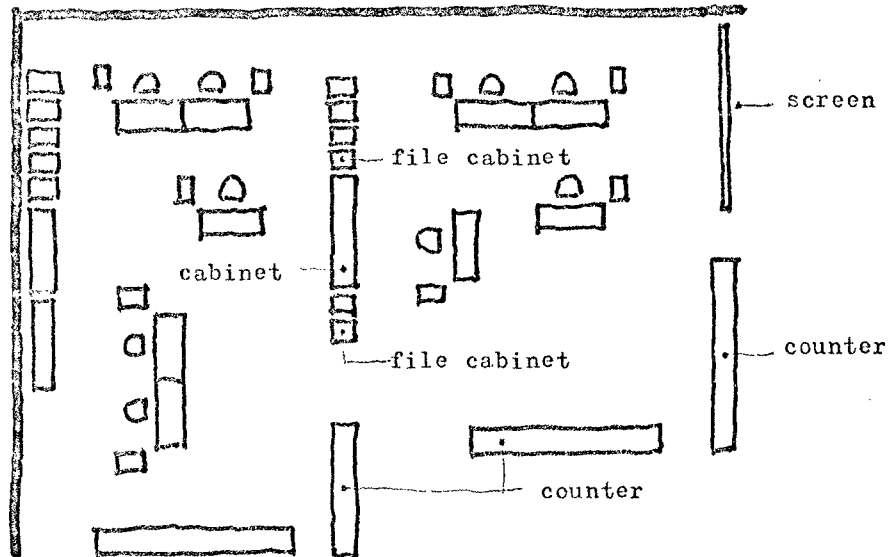


Fig. 7.2 A Scheme of General Office Arrangement

## 7.2 INFORMATION DESK

Information desk is a place where inquiries of visitors are answered. Some small schools do not have an information desk at all (though 75% do) since the administration may feel that it is too costly to employ an attendant, or it may think that a main desk attendant does not seem to be doing much, therefore deciding that it is not a necessity. But a good administrative system should always be ready to respond to inquiries of visitors and to furnish adequate information of the school system and structure when necessary. On the other hand, the administration needs to have control over the usage of the building and to eliminate unauthorized entry etc.

In order to solve the above-mentioned problems, the administrative offices should be next to the information desk, and the office receptionist should also serve as a desk attendant during her office hours. This assumes, of course, fairly light traffic at the desk during standard office hours.

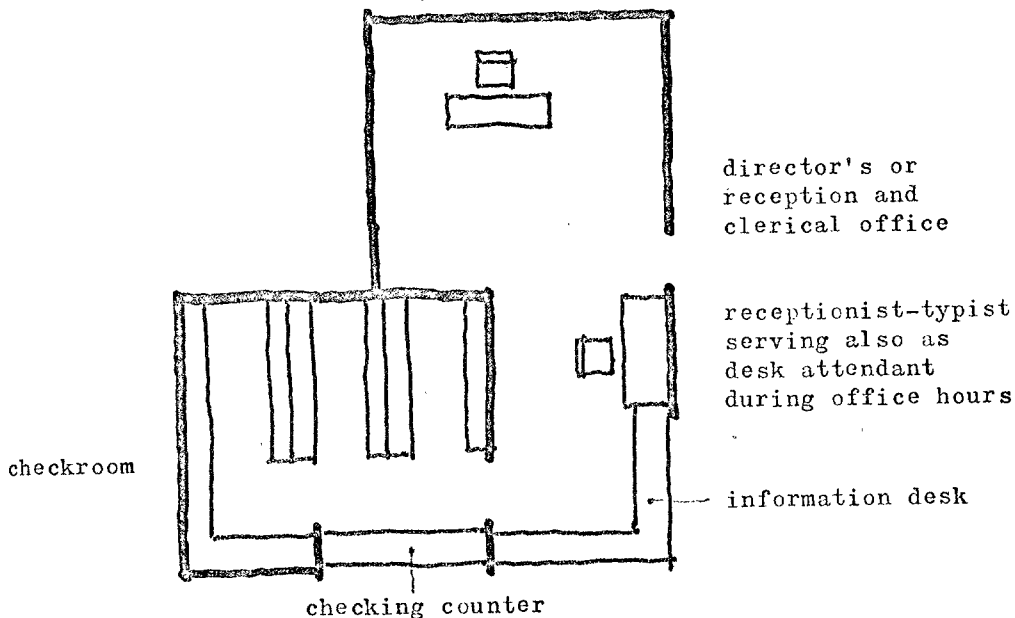


Fig. 7.3 Director's Reception and Clerical Office combined with Information Desk

The sketch shown above (Fig. 7.3) is a combination of the Information Desk and the Reception room. The picture on next page shows the Information Desk at the Muhlenberg Union, where the office receptionist attends the desk during off-peak periods. ((5), P.56).

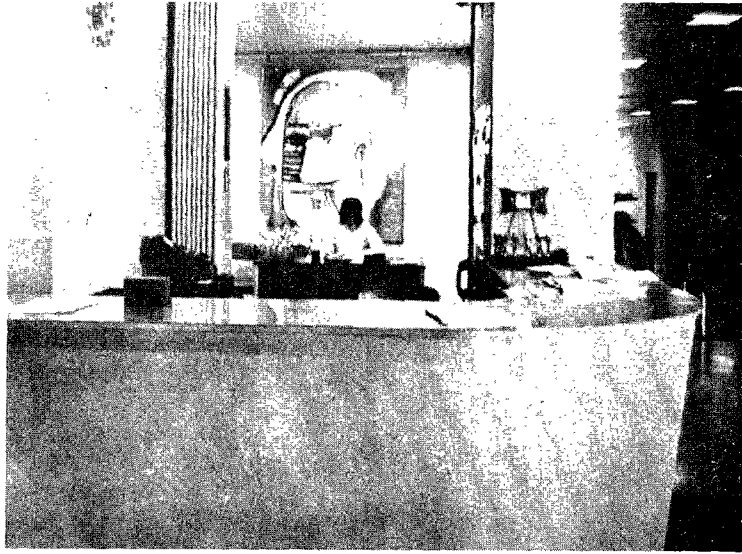


Fig. 7.4 Photograph Showing The Plan of Fig. 7.3

### 7.3 CONFERENCE ROOM

Conference room is a place for meetings, consultation, discussion, exchange of views etc. held by teachers, administrators, students and members of the school board.

While a big school can afford such a space, from the point of view of economy, a small school should not provide a space just for this occasional usage. It should maximize the utility of space by making this function a multi-purpose room which can be used for reception purpose or as a lounge if proper arrangements could be made.

The accompanying sketch (Fig. 7.5) shows the conference room providing a meeting place for teachers, students, and board meeting, a lounge for staff and a consulting room at the same time. Individual lockers for each member of the school staff are provided ((14) p.78).

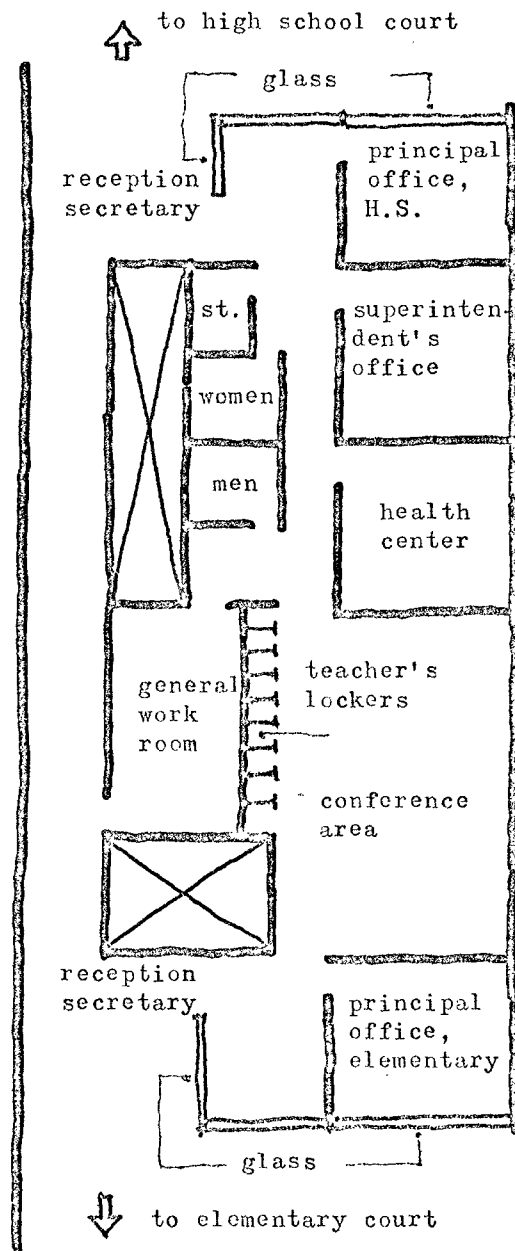


Fig. 7.5 The Central Administrative Area in The Wilbur School

7.4 TEACHER'S CENTER

Teacher's center is a work center for teachers, with reference materials, files and supplies close at hand, and should be more than just a desk and chair. It should serve as an area suitable for counselling and possibly for small group activities led by the teacher. It should be designed to be an efficient and attractive place where the teacher will want to work and the student will want to visit. ((3) p.52)

Usually it is located in the administration area or adjacent to the classroom. Sometime it is in a common space in a modern school. Furniture and furnishing should be flexibly arranged in order to suit any required situation such as counseling, seminar or conference. The following sketch shows how a teacher's desk can accommodate several persons for the above purposes just by simply pulling out a board from the desk. (refer to Fig. 8.12 (iv))

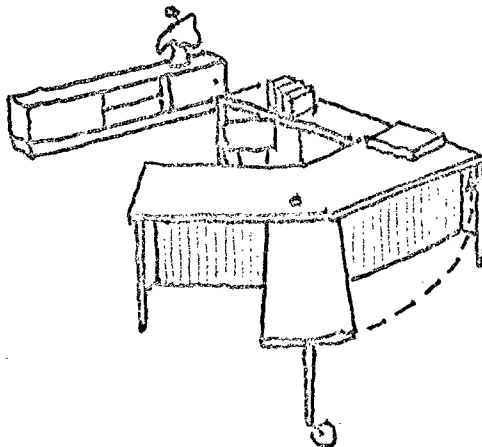


Fig. 7.6 The Flexible Teacher's Work Desk



## 7.5 LOUNGE

Lounge is a place for administrators, workers, office staff and teachers to relax. It is equipped with comfortable furnishings such as sofa, tea table, mats etc.

In view of a flexible use of space, the lounge can be combined with some different functional space as discussed in the following:

### (1) Lounge and Entrance Combination

The entrance lobby can be blended into an open lounge area. In this case the entry area of the administration building will give a more open and hospitable atmosphere, at the same time providing space flexibility.

Some planter boxes, decorative screen dividers, a change in ceiling height, carpet, or merely a strategic arrangement of furniture can serve the purpose of differentiating the functions of the two areas without imposing restrictions to the traffic flow. In this way it becomes possible to size the lobby for normal traffic loads and yet accommodate the spotadic larger groups without the usual difficulties with a welcoming reduction in the cost of construction along the way (omission of doors and masonry walls and an overall reduction in space). Letting the lobbies flow into conversational lounge areas, separated psychologically but not physically, makes the administration area apparently larger and more attractive throughout.

It can be objected that the lobby traffic causes

noise and distraction for the loungers or prevents the lounge area from being used for program purposes. But sufficient attention to the acoustic treatment of the lobby, coupled with carpeting in the lounge, can minimize, or virtually eliminate, noise interference.

There is the matter of why people are in the lounge in the first place. Parents or members of the school board habitually wait for their children or other members to come in the lobby, and they want to see them when they come. In this sense the lounge is indeed part of the lobby, and needs to be one.

As far as special program in the lounge is concerned, some believe it should not be held too often. The open lounge can be used for program purposes - by setting up portable screens at the entrance. At times, an entirely open situation is best called for. ((5) p.43

The concept is illustrated as follows:

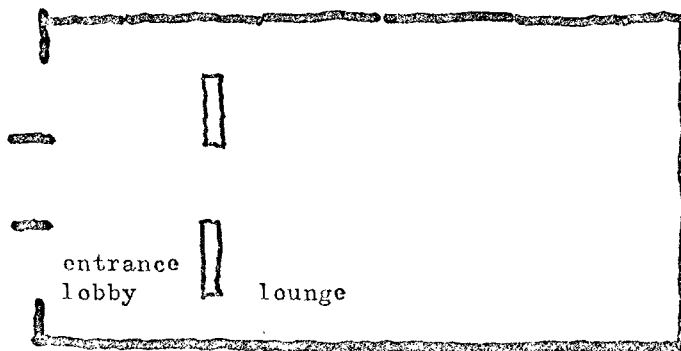


Fig. 7.7 A Scheme of Lounge and Entrance Lobby Combination

## (2) Lounge and Reception Combination

Reception area can be combined with a lounge since the simultaneous needs of both areas for different purposes are rare. The following illustration (Fig. 7.8) shows this combination.

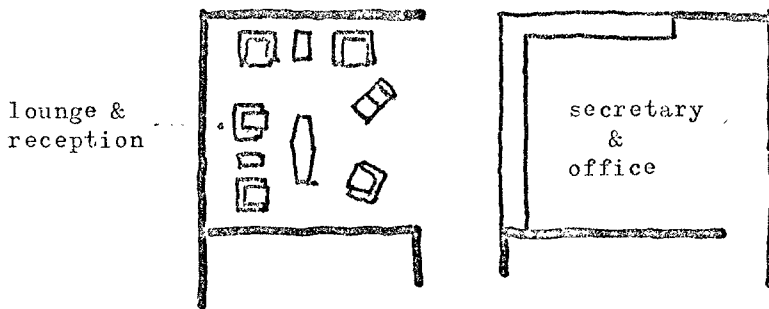


Fig. 7.8 A Scheme of Lounge and Reception Combination

## (3) Lounge and other Functional Combination

A lounge in an administration area can be used as a counselling room as well as a multi-purpose room. A multi-purpose room can suit all kinds of activities.

In case there is need for a TV viewing room in an administration area, this space can be combined with the lounge and the area needed for both purposes can be reduced.

The sketch on next page shows how a TV room is built for steady viewers next to the main lounge, with a folding partition in between. In cases when the president comes on the screen with a special message, e.g. the local popular game, the partition can be removed to accomodate additional people in the

lounge to watch the program. ((5) p.50)

TV room can be used as a meeting place, or for counselling purpose by closing the folding partition.

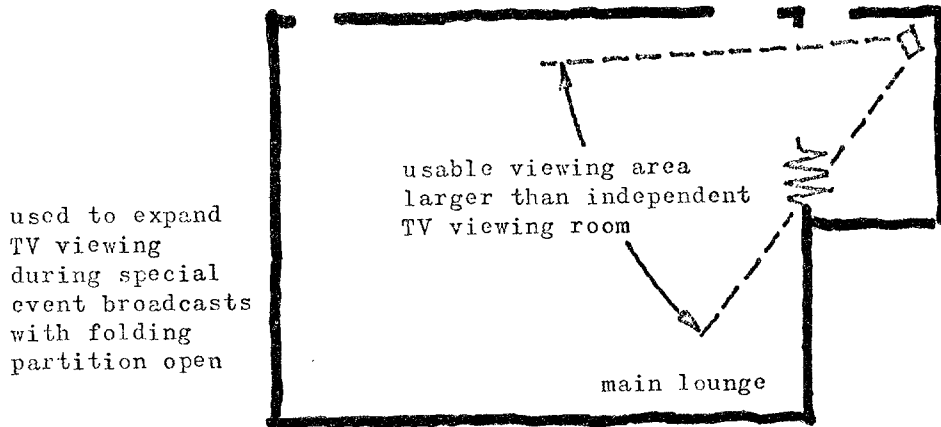


Fig. 7.9 The TV Viewing Area Combined with Main Lounge



Fig. 7.10 Photographs Showing The Plan of Fig. 7.9

8.

## F A C I L I T I E S     I N     F L E X I B L E     S P A C E S

Good flexible space is based on furnishings and equipment to be used. The lack of suitable furnishings can turn flexible space into complete loss.

The following sections offer some answers in sketch form as to suggestions of what the architects and educators should be seeking -- to make those classroom spaces of the future school more effective for teaching and learning than they are with currently available furniture and equipment. Some existing units come close to the sketches; others require modifications to match them; still others are in the process of productive development. All can be part of the school plant and classroom of the present or the immediate future.

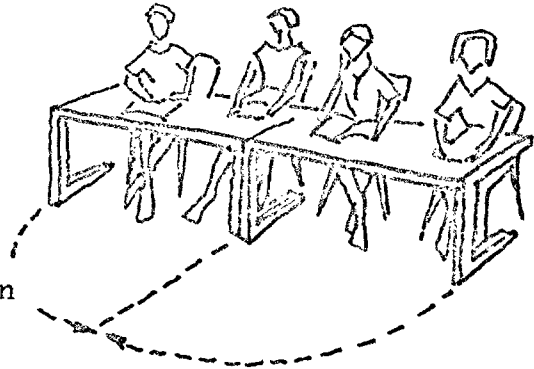
8.1 FURNITURE

## (1) Desk and Table

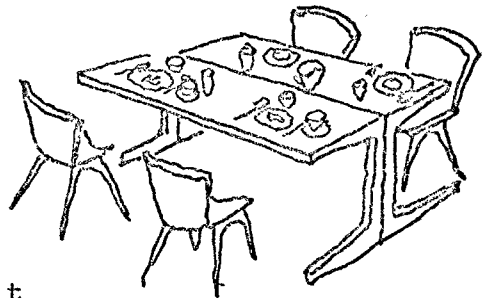
## a. Rectangular Table:

Sketch on the next page (Fig. 8.1) shows the use and

combination of rectangular table. It is applicable for use in commons or cafeteria, etc. ((3) p.55)



(i) Grouped for Television Class or Study Unit



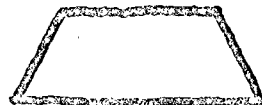
(ii) Grouped as Lunching Unit

Fig. 8.1 Rectangular Table and Its Group

b. Trapezoid Study Unit

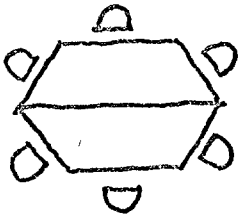
Fig. 8.2 shows a trapezoid study unit, is model and its combination. It is a useful model for the modern school.

((3) p.54)

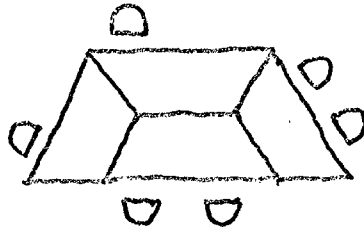


(i) Trapezoid Study Unit Module

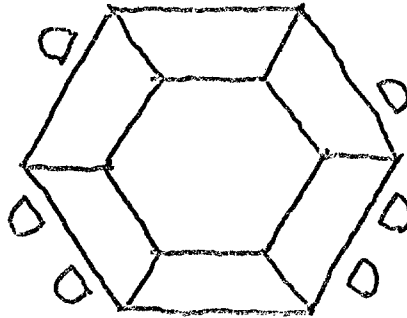
Fig. 8.2 Trapezoid Study Unit and Its Combination



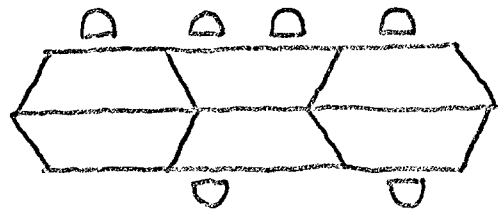
(ii) Two Combination



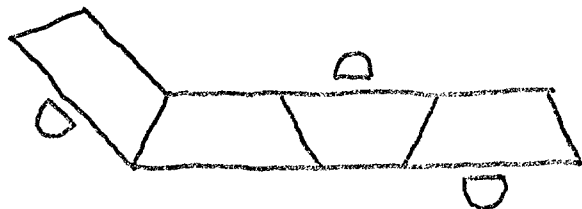
(iii) Four Combination



(iv) Six Combination



(v) Linear Combination



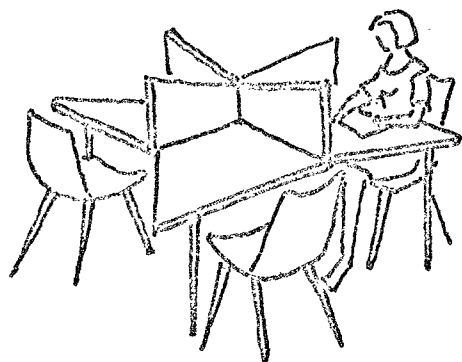
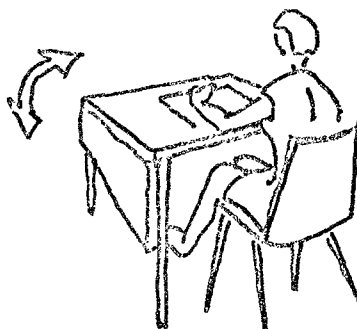
(vi) Linear Combination

Fig. 8.2 Trapezoid Study Unit and Its Combination (cont.)

(i) Trapezoid Study Unit  
with Drop Leaf, Module



(ii) Four Combination



(iii) Linear Combination

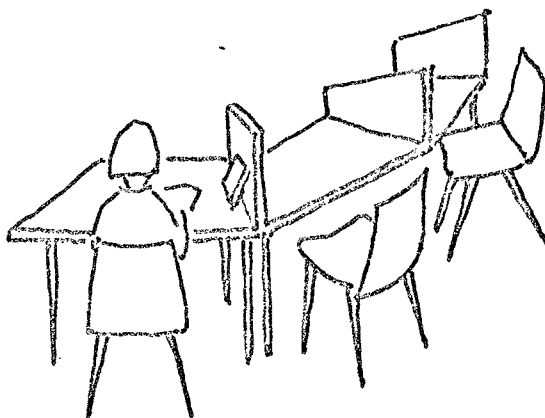


Fig. 8.3 Drop Leaf Trapezoid Study Unit and Its Combination

c. Drop Leaf Trapezoid' Study Unit

Fig. 8.3 shows the model and the combination of this unit. It can be flexibly used and grouped in various combination



in the modern school, such as serving the individual study unit, drop leaf for larger work top as well as a divider. ((3) p.54)

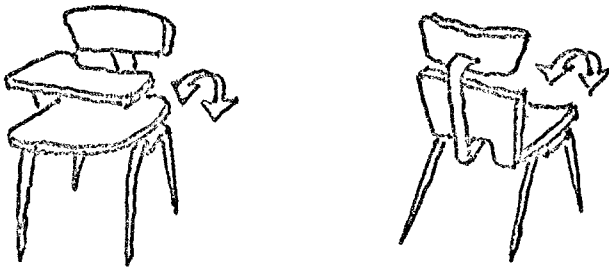
## (2) Chairs and Seatings

Convertible chairs and seatings suit the purpose of flexibility.

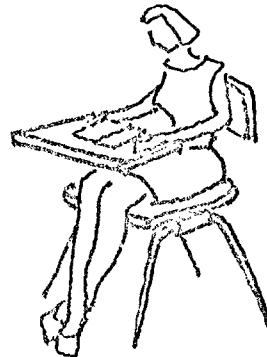
### a. Convertible Seating

Convertible seating is a chair that can be rotated forward and backward. It can be used for different purposes such as general seating, note-taking, independent studies or combining with a seminar table or forming a lunching unit.

Sketches are shown below: ((3) p.55)



- (i) Writing surface rotates forward into use position



- (ii) Used as classroom study unit

Fig. 8.4 Convertible Seating and Its Combination

(iii) Combined for Cafeteria  
Lunching Unit

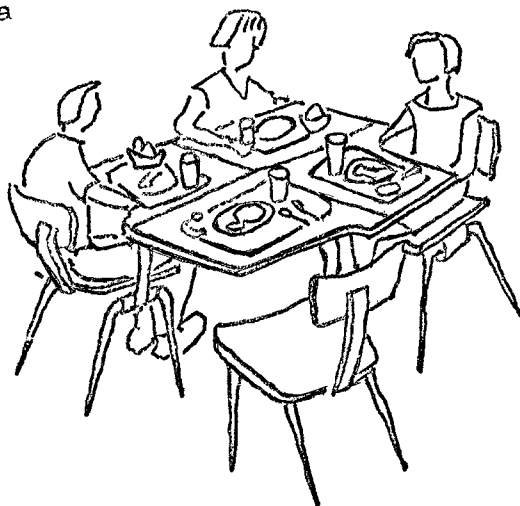
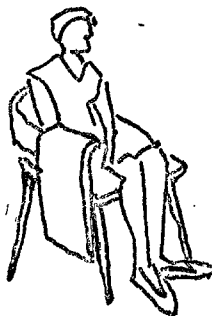


Fig. 8.4 Convertible Seating and Its Combination (cont.)

b. Convertible Spaced Seating

(i) With disappearing writing surface ((3) P.55)



(ii) Writing surface rotates forward and down into use position



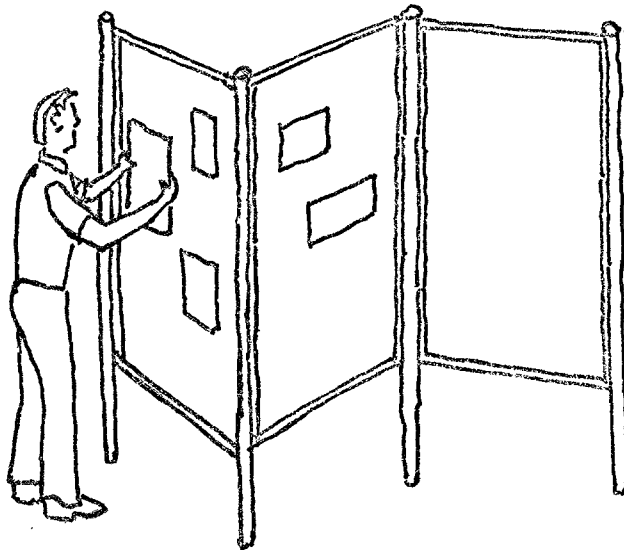
Fig. 8.5 Convertible Lecture Space Seating

(3) Space Divider

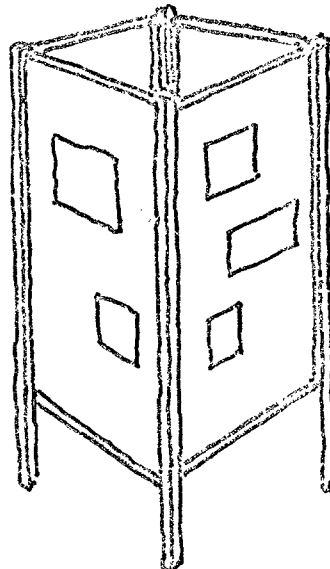
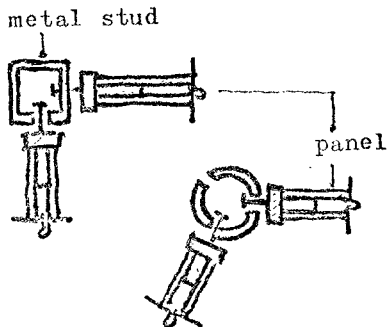
A space divider is a board or a panel used for dividing space. Panel board is generally used as an exhibition board. Folding it the right way can turn it into a space divider too.

((3) P.54)

(1) Perforated Board or Corkboard



(ii) Combination learning teaching exhibition surfaces & storage



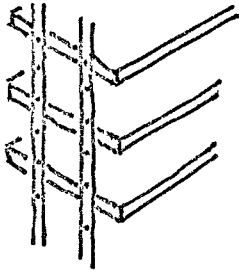
(iii) Detail for combination

Fig. 8.6 Panel Board

(4) Shelf and Cabinet

Shelves and cabinets must be changeable and movable and can be converted different features. Examples are shown below: ((19) P.9) ((3) P.54)

(1) Flat Book Shelf



(ii) Inclined Book Shelf

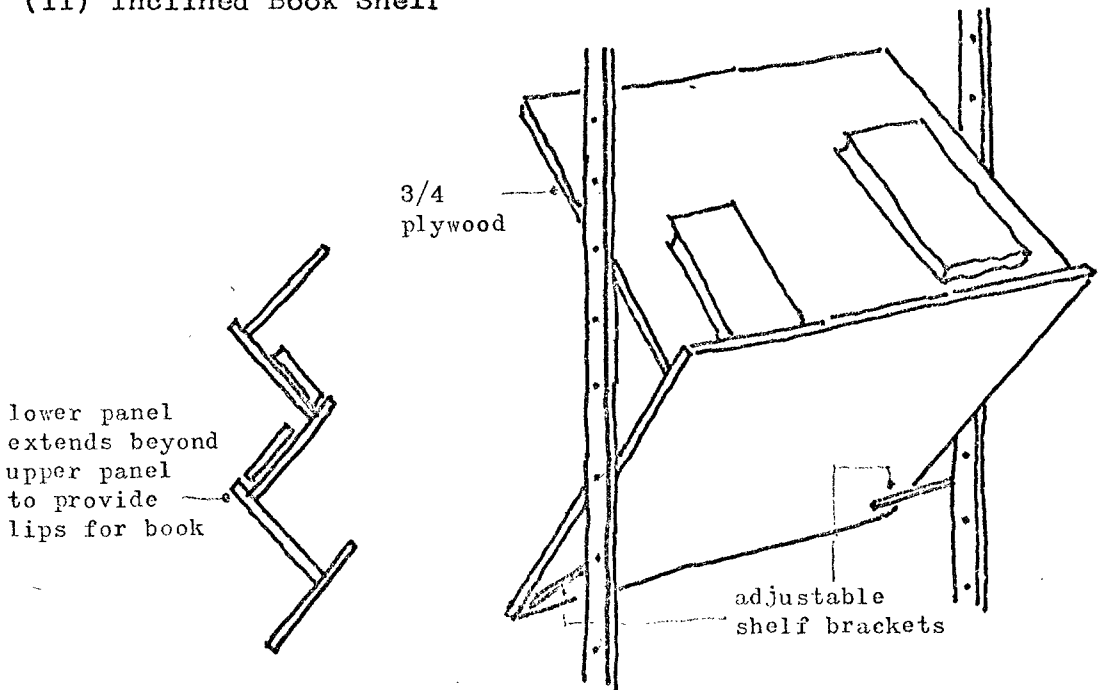
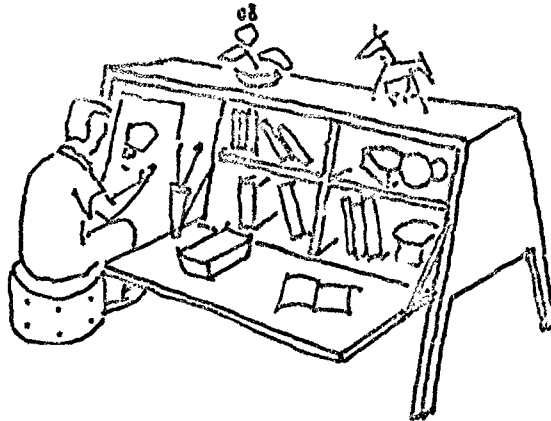
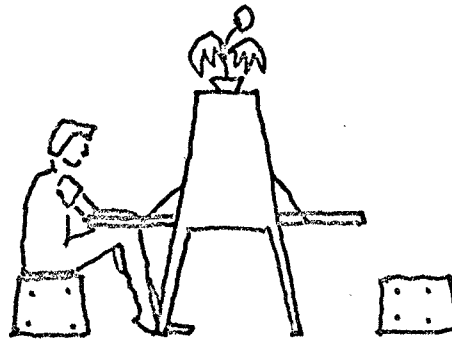


Fig. 8.7 Convertible Book Shelf



surfaces, storage for related equipment



The door of cabinet can be used as a working or a reading table

Fig. 8.8 Convertible Cabinet

#### (5) Study Carrel

A study carrel is a small reading table with space screen on top. Sometimes it provides shelves or audio-visual equipment on or in the screen ((18) P.11) ((13) P.64).

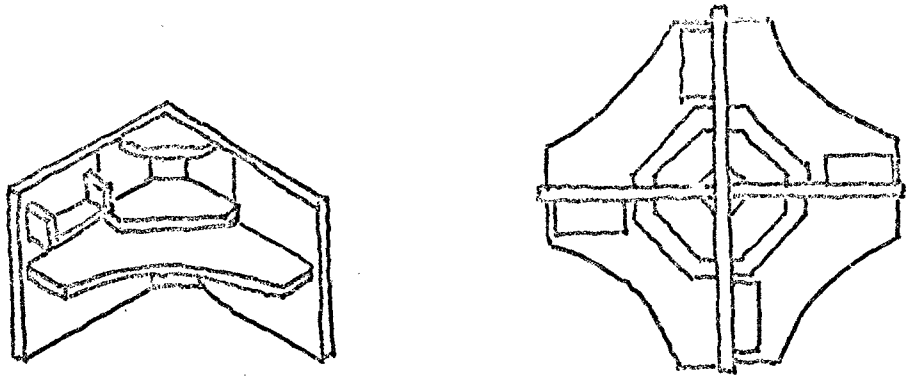


Fig. 8.9 Carrel for Portable Equipment

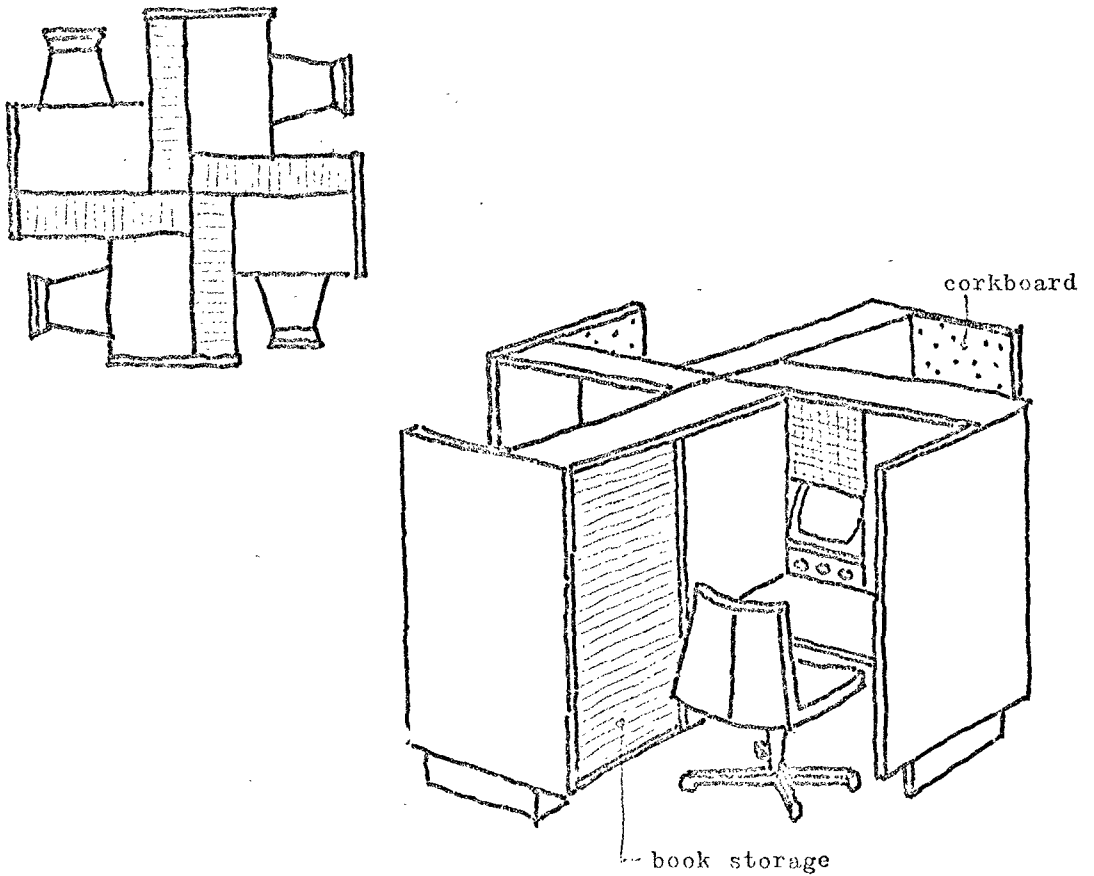


Fig. 8.10 A-V Listening and Viewing Carrel

(6) Foldable GYM stands

Stands are used as seats in gymnasium. They occupy plenty of space. If the gymnasium uses movable stands, it takes time to remove them regularly and thus calls for a storage place. Sketch shown here is a foldable gym stand which can be pushed to the wall when not in use. ((27) p.88)

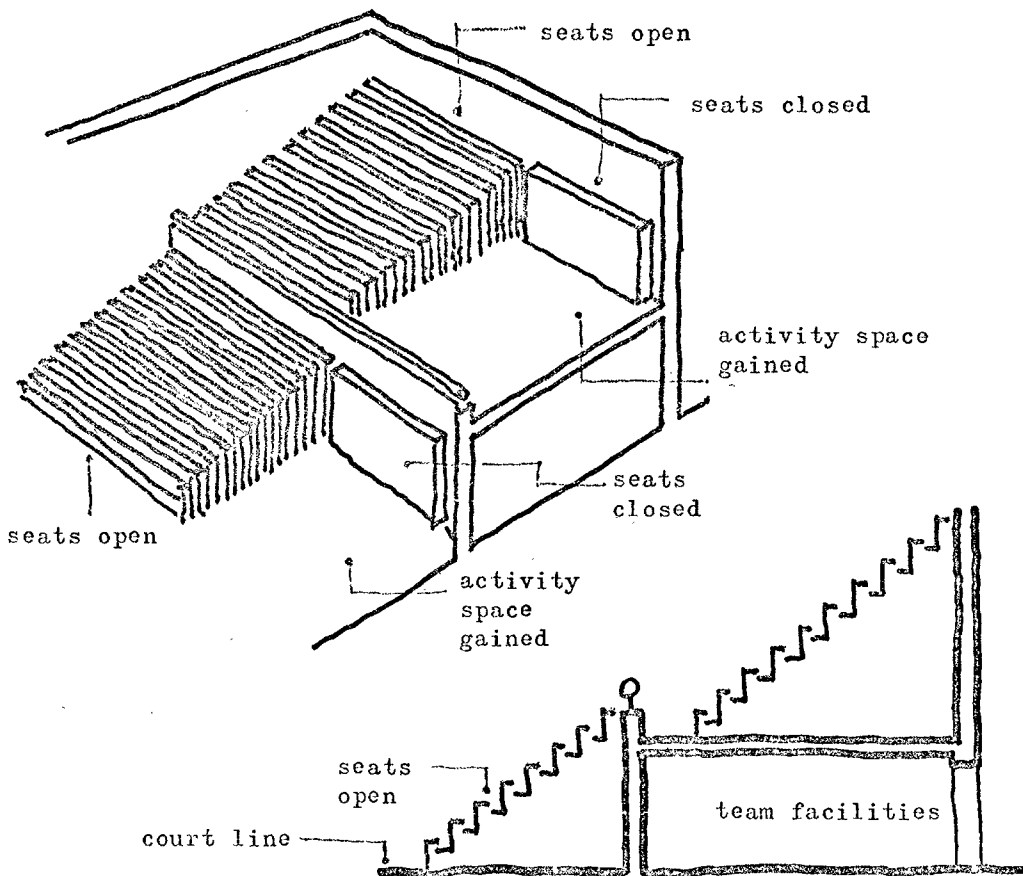


Fig. 8.11 Foldable Gym Stands

8.2 OPERABLE PARTITION

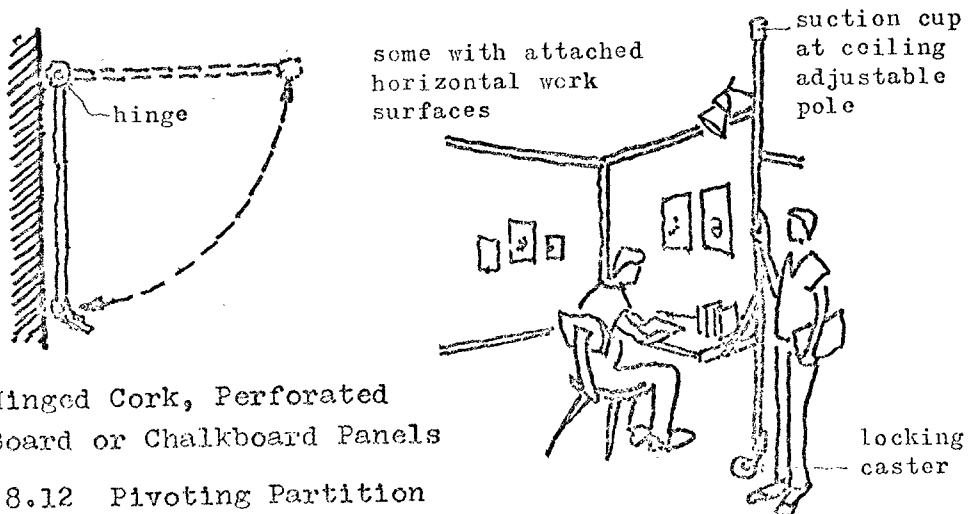
This section deals briefly with the types of partitions available, giving some general comments on the insulation of sound, and suggesting general guidelines for selection.

(1) Types of Operable Partitions

Various materials have been tested and employed in operable partitions, ranging from steel, wood, and fabric to lead-impregnated plastics and multi-layer compositions of two or three different materials. In terms of structure and organization, the operable partition basically can be divided into five types: (5) (28)

a. Pivoting Partition

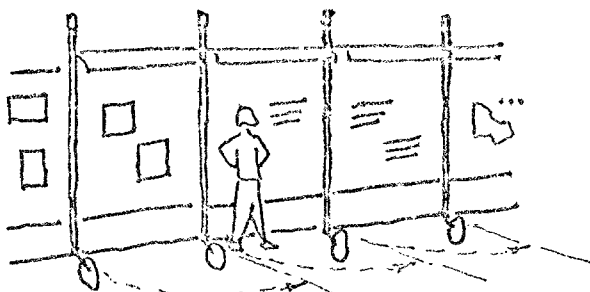
A panel with one side of its frame hinged to the wall so that the panel will stay in position while the other side of the frame can swing freely on the hinge, constantly keeping the panel perpendicular to the wall. (Fig. 8.12) ((3) p.50)



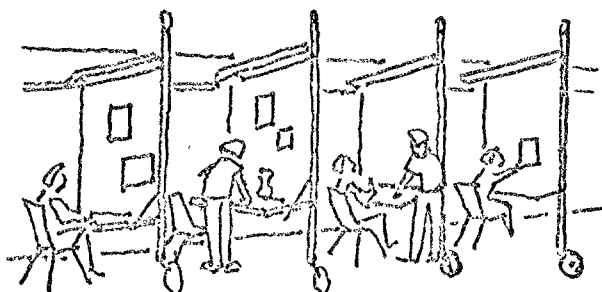
(1) Hinged Cork, Perforated Board or Chalkboard Panels

Fig. 8.12 Pivoting Partition

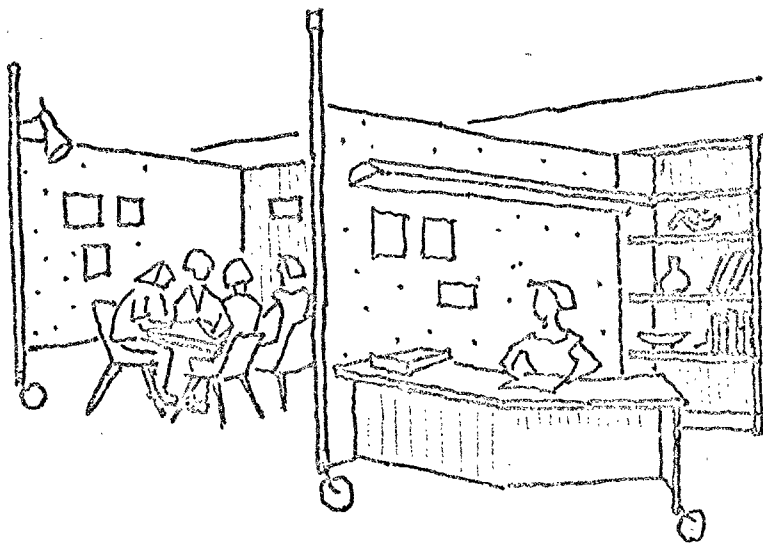




(ii) Pivoting partitions pushed back to the wall to be used as bulletin boards.



(iii) Individual and double pupil study and carrels in class spaces, library, resources center, language lab, etc.



(iv) Group study alcoves and desk unit.

Fig. 8.12 Pivoting Partition (cont.)

b. Vertically Moving Partition

Vertically moving partitions can be sub-divided into two types: one type can be rolled up into a pocket in the ceiling in a manner similar to that of a window shade. Occasionally we call it OVERHEAD ROLLING WALL (Fig. 8.13).((3) p.52) Another type is made by solid wood or metal like a shutter sliding from the top or ceiling or jetting from the bottom or floor. We call

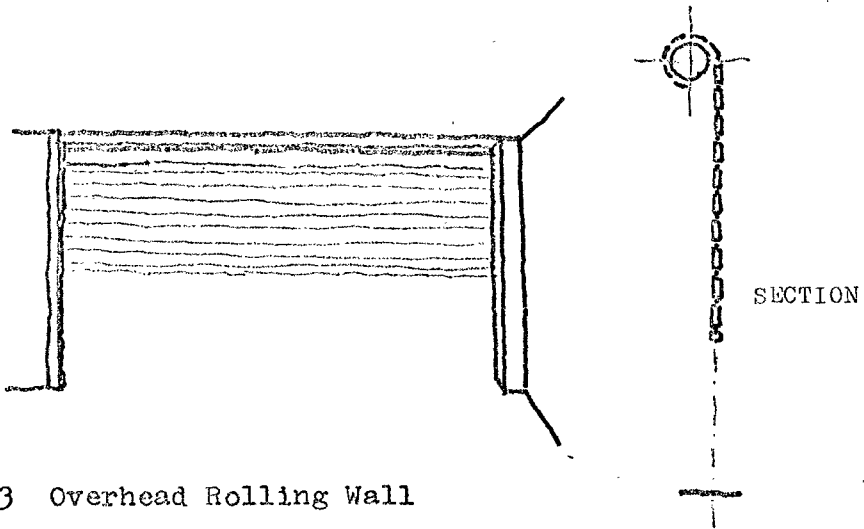


Fig. 8.13 Overhead Rolling Wall

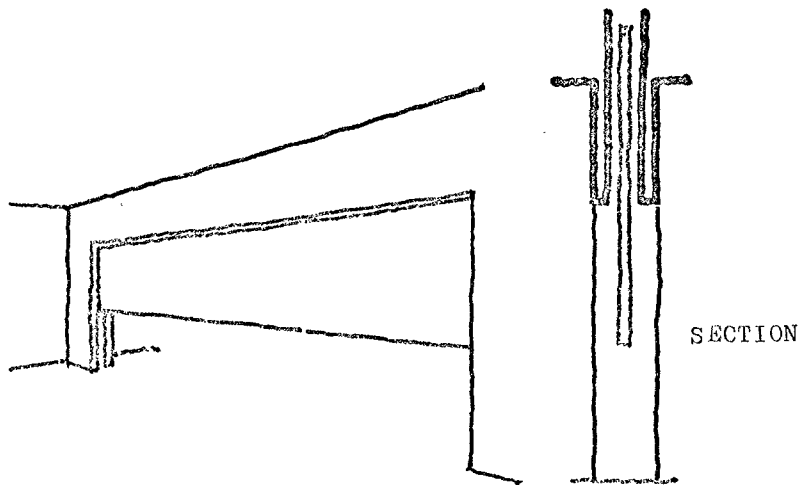


Fig. 8.14 Overhead Sliding Wall

it OVERHEAD SLIDING WALL (Fig. 8.14). Both of them are sometimes used in balancing the weight of each other. (see 6.3 Auditorium (2) Divisible Auditorium)

c. Coil Partition

The coil partition is made of wood board strips held

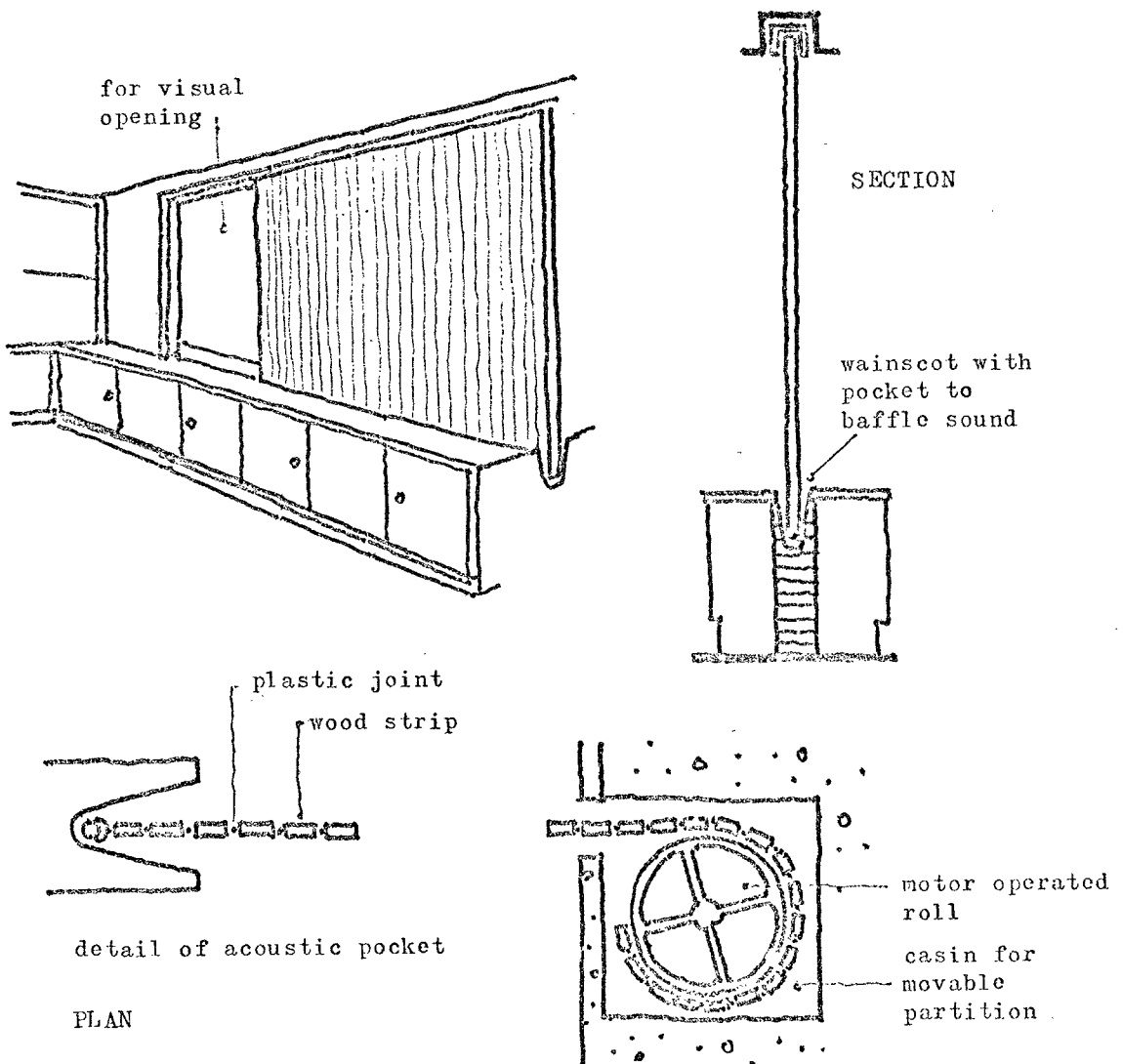


Fig. 8.15 Coil Partition

together by plastic strips. It moves horizontally onto a roller located at both ends of the partition line (Fig. 8.15).

Wainscot-height partition, beginning at desk height, recognises the fact that clear sight lines and passage of sound are often all that is necessary to allow two learning groups to function as one -- physical access from one area to another need not be accomplished through the opening. Therefore, in this facility, it is sufficient to open the partition without removing the fixture when the two rooms are grouped for a specific function.

#### d. Accordion Partition

An accordion partition is made by plastic leather fastened to a metal frame. It can be elongated from the end of the partition line to another end or from both ends of the partition line to the middle point. It works like an accordion or the bellow of a camera (Fig. 8.16).

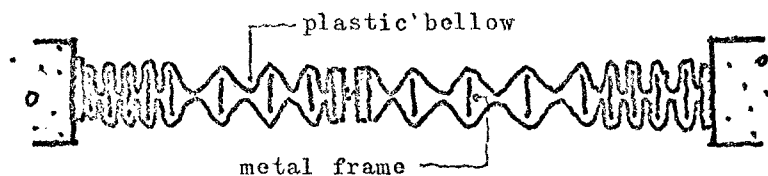


Fig. 8.16 Accordion Partition

#### e. Panel Partition

Panel partition is made by wood or plastic board fastened to a piece of wood or metal frame like a door panel. It constitutes the majority of partitions installed and consists

of folding and sliding or hinged and independent category (Fig. 8.17, 8.18). The hinged panel group is further divided between partitions in which all of the panels are hinged in pairs, and end-hung single panels are hinged with both floor and ceiling tracks.

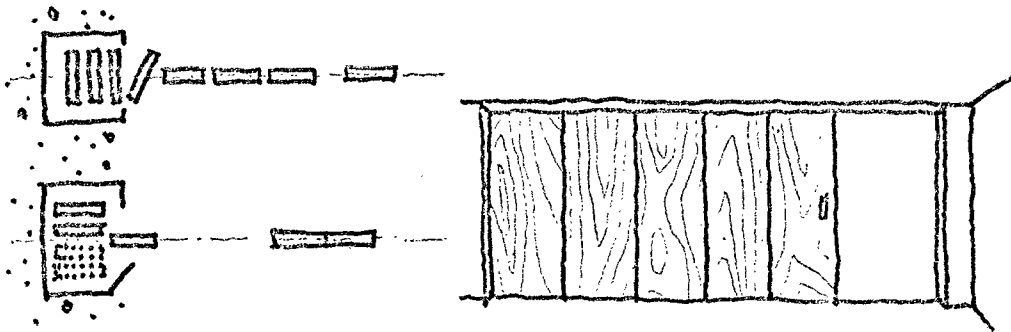


Fig. 8.17 Horizontal Sliding Wall

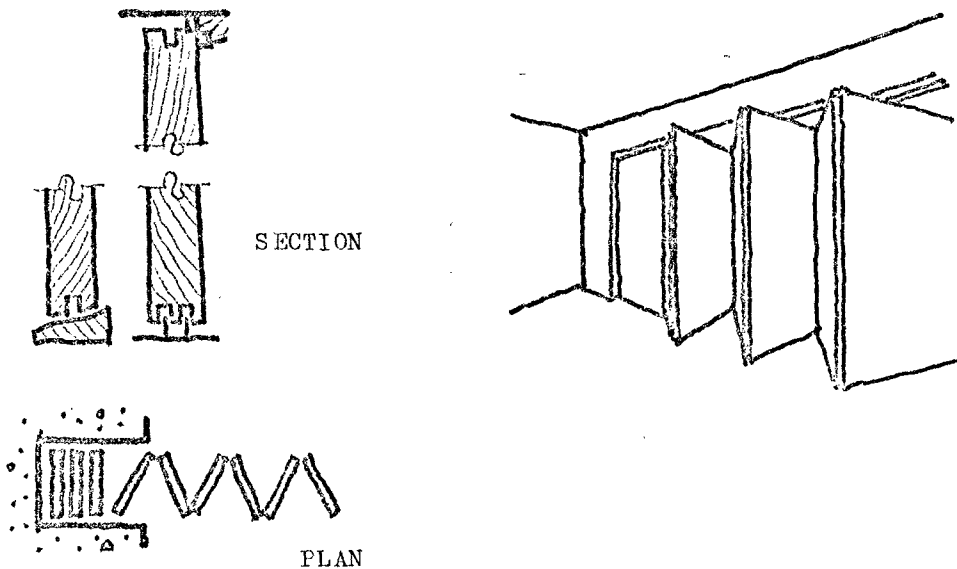


Fig. 8.18 Horizontal Folding Wall

## (2) Operation of Operable Partitions

Subdivisions are of importance in terms of OPERATION of the partition. It is not possible to motorize panel partitions unless they are fully hinged. Therefore, all of the independent panel partitions and hinged pair partitions must be manually operated regardless of their sizes. Fully hinged panel partitions and accordion partitions may be either manually operated or motorized, though, in larger openings, fully hinged partitions are usually too heavy to be operated manually. Both the vertically and horizontally coiling partitions must be motorized.

### a. Motorized Partition

This partition can obviously be operated by a student or a staff member without difficulty. However, it is expensive and it moves slowly. The speed of movement may not be important depending on the type of scheduling in the room.

### b. Manually Operated Partition

This partition, if not too big or poorly designed, can be easily handled by students or staff members, as it can be extended or contracted very easily and takes only as much time as moving it across the room.

Occasions in which full capacity of space is needed are rare, and therefore, the walls seldom would have to be opened. So manually operated walls, though more difficult to move, could be used in place of the more expensive mechanically operated types. (5) (28)

### (3) Acoustics of Operable Partitions

Acoustics of operable partitions can be considered in two terms: sound absorption and sound insulation.

In general, sound absorption is not provided by any of the finishers normally provided by panel partitions. Furthermore, absorption is not really a function of an operable partition. Control of reverberation or noise should be handled by efficient absorbing material such as acoustic tile installed on the ceiling.

Occasionally when the folding partition becomes the "back Wall" of a room greater than 50 feet or 60 feet in length, absorption along the side of the partition facing the platform may be required for echo control. This becomes extremely costly and greatly affects the stacking space since efficient sound absorbing materials mostly used are one inch thick.

Although accordion partitions cannot be considered as efficient sound absorbing surfaces, they provide far more sound absorption than flat wood or metal panel. Often, therefore, when cost or space prohibits efficient absorption purpose, the use of accordion partition is a satisfactory compromise as a means of echo control.

Sound insulation is often expressed by manufacturers as the effectiveness of the partition. It is usually expressed in acoustics as a SOUND TRANSMISSION CLASS (STC) rating. Generally, the rating of STC of a movable partition available ranges from 20's to 50's. An STC of 40 indicates the partition to be roughly as effective a sound barrier as a 4 in. cinder-

block wall. ((5) p.107, (7) p.37)

Due to differences in both installation techniques and conditions of the surrounding structure, the partition should not be expected to provide the same transmission loss in the field as it does in the laboratory. Field data can be anywhere lower than laboratory data on the same partition. A large percentage of this difference can be accounted for by the degree of compliance of the gaskets around the perimeter of the partition.

The acoustic quality of the partition itself will give much less value if an effective sealing system is not provided to insure that sound will not leak through joints or around the edges of the partitions. In all cases, the quality of the product must include the capability of the seals and gaskets to function well over a period of time.

The transmission loss is not the only factor affecting total insulation provided in the field installation. The area of partition and the amount of sound absorption in the rooms also have individual effects. In general terms, as the area of the partition is made smaller and as the amount of absorption in the two rooms is made larger, insulation will be more effective.

Absorption in rooms is desirable for a vast majority of functions and not only for its contribution to the insulation of divided spaces. It also absorbs disturbing sounds and cuts down noises made during various activities.

A quantitative amount of sound insulation needed in



a given situation is to prevent activities on one side from disturbing activities on the other. In view of the wide range of activities from noisy dancing parties to small lectures, this approach may prove beneficial. The quantitative approach involves establishing the maximum amount of noise that any given activity can make and subsequently selecting partition insulation values that can reduce this sound to a value corresponding to some subjective conditions as "inaudible", "audible but not disturbing", or "unintelligible" to the adjacent rooms.

If given an accurate indication of the activities and the scheduling patterns, the insulation required to achieve any of these subjective values can be figured out with accuracy from manufacturers' published catalogs. This procedure is too complex for any detailed descriptions here. However, the following general statements can be made:

- a. The sound of all activities in rooms can be divided into music (live, amplified or reproduced, including movie sound tracks), gabble and speech (live, amplified or reproduced).
- b. The gabble of voices at tea, exhibition or dinner is not likely to be disturbed by surrounding activities, and because of its unintelligibility, will not disturb many other activities.
- c. Speech, as in a lecture, will not usually disturb but can easily be disturbed by surrounding activities.
- d. Serious musical performance should not be carried

out in a subdivided room when other activities are scheduled in other portions. For, at its loudest, it will disturb quieter surrounding activities, and at its softest, it will be disturbed by almost any intruding sound.

- e. In general, to insulate the most disturbing from the most easily disturbed activities, two completely separated partitions, spaced approximately a foot apart, need to be used. Beyond one foot of space, the partitions will begin to act as two completely independent partitions with a room in between. (Center-hung panel partitions, of course, must be at least four feet apart at the pocket side to allow clearance). In general, in the installation of two separated partitions, it makes no appreciable difference acoustically whether the partition are of the panel, accordion, or coiling type, assuming that the performances of the single partition are the same.
- f. A vast majority of insulation tasks in rooms are met with a partition rating of STC 40 to 45, though music with this low rating will disturb a speech activity.
- g. Unamplified speech activities ( i.e. two simultaneous lectures) will typically be adequately separated by partitions providing STC 35 to 40.
- h. Partitions rated at less than STC 30 should function

as visual barriers only.

(4) Partition Selection Criteria

Comments have been made previously regarding such selection factors as height, operability, motorization, and sound insulation. Cost is inevitably a vital selection criteria. Fig. 8.19 indicates the relation of cost to sound transmission class. Numeric scales are not included. It should be noted that these statistics are based on laboratory data as published by the manufacturers. ((5) p.112)

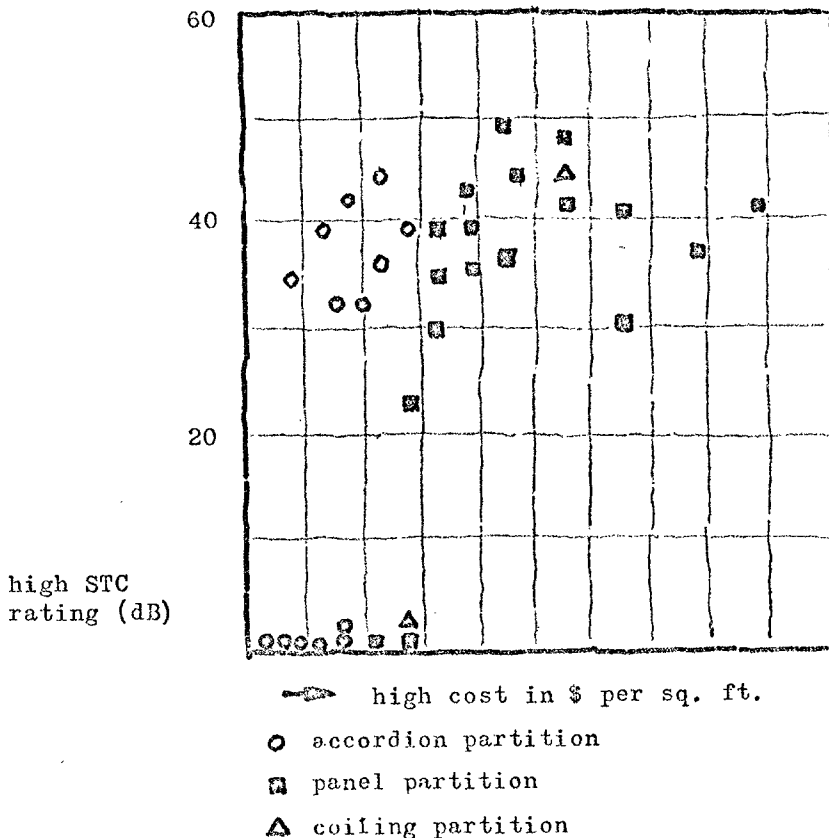


Fig. 8.19 Standard Transmission Class Ratings of A Group of Operable Partition in Relation to Costs per Sq. Ft.

Access and egress should be available through doors, lobbies, corridors, etc., which are part of the fixed construction. "Wicket" or "pass" doors through the folding partitions should never be included in the planning as they are always a weak link in sound isolation.

9.

## C O N C L U S I O N

The general discussion thus far has focused on the following points:

- a. the concept, the necessity and the achievement of flexibility in a elementary and high schools;
- b. the flexible and multiple use of space in general teaching areas -- group division and group combination;
- c. the combination of different functional spaces for special subjects and in the administrative area;
- d. the auxiliary facilities in flexible spaces;

planning for flexibility in a space may involve compromises in the design and materials which may reduce the ability of a space to perform while for a single purpose. Also, a flexible-function room is almost sure to cause extra difficulties in scheduling, and in moving furniture and equipment to make the space ready for another use.

Sometimes, certain auxiliary spaces (e.g., storage) or spacial equipment (e.g., movable or operable partitions) are needed to achieve satisfactory flexibility, and this may largely

offset space savings in other directions. Generally, the saving in actual construction cost is often not as great as might be first assumed when the original consideration was merely the space saved.

Despite all the above considerations and cautions, whenever study of this nature found a reasonably feasible solution for the flexible- or multiple-use of a space, resulting in a worthwhile construction saving, an operating saving, or a desirable flexibility to meet unexpected needs, included for consideration.

The examples or illustrations presented in this thesis are not attempts to show the "ideal layout", or "ideal room shapes or sizes". They are schematic, often oversimplified to focus on the element of flexibility. Indications of control points, storage, services, etc., are not recommendations for their exact locations or relationships. These are all conditioned by the total building scheme, feasible circulation and access -- in short, they can only be specifically designed for a specific scheme. But, by and large, the principles of what are desirable, and approximately at where, should be observed.

There are, of course, more opportunities for / areas of flexibility than are shown in this thesis. But the author believes that he has tried his best to consider all the possible situations concerning special flexibility occurring in a school. It is hoped that the examples, shown here, as yet not too common or too well understood, will add to the handbook of the school planner.

## EXAMPLE CREDITS

- E 1 F. 4.4 LEWIS SANDS PRIMARY SCHOOL, CHAGRIN FALLS, OHIO, U.S.A.  
Architects: Dalton & Dalton Associates
- E 2 F. 4.7 FAIRMONT ELEMENTARY SCHOOL, PACIFICA, CALIFORNIA, U.S.A.  
Architects: Masten & Jurd
- E 3 F. 4.8 WILLIAM FARIA ELEMENTARY SCHOOL, CUPERTINO, CALIFORNIA,  
U.S.A.  
Architect: Edwin J. Meyers
- E 4 F. 4.12 BARRINGTON MIDDLE SCHOOL, ILLINOIS, U.S.A.  
Architects: Cone & Dornbusch, Spencer B. Cone
- E 5 F. 4.14 COVINA & NORTHVIEW HIGH SCHOOL, U.S.A.
- E 6 F. 4.15 GEORGE MINER ELEMENTARY SCHOOL, SAN JOSE, CALIFORNIA,  
U.S.A.  
Architects: Porter - Gogerty - Meston & Associates
- E 7 F. 4.16 SIERRA VISTA SCHOOL, U.S.A.
- E 8 F. 4.19 GRANADA COMMUNITY SCHOOL, BELVEDERE - TIBURON,  
CALIFORNIA, U.S.A.  
Architect: Callister & Rosse & EFL
- E 9 F. 4.20 McPHERSON SENIOR HIGH SCHOOL, McPHERSON, KANSAS, U.S.A.  
Architect: Shaver
- E10 F. 4.21 DEATH VALLEY HIGH SCHOOL, U.S.A.  
Architect: Robert Trask Cox
- E11 F. 5.1 ANDREW DRAPER HIGH SCHOOL, SCHENEVUS, NEW YORK
- E12 F. 5.2 JEFFERSON INTERMEDIATE SCHOOL, MIDLAND, WICHIGAN, U.S.A.

- E13 F. 5.4 FRANKLIN CERTRAL SCHOOL, NEW YORK, N.Y.  
& KOHLER, WISCONSIN, U.S.A.
- E14 F. 5.5 PORT GIBSON HIGH SCHOOL, U.S.A.
- E15 F. 5.8 & F. 6.11 KOHLER HIGH SCHOOL, KOHLER, WISCONSIN, U.S.A.
- E16 F. 5.12 BEDFORD MIDDLE SCHOOL, MT. KISCO, NEW YORK, U.S.A.  
Architect: The Architects Collaborative
- E17 F. 5.14 AMORY SCHOOL, AMORY, MISSISSIPPI, U.S.A.
- E18 F. 6.6 FINE ARTS, HUMANITIES CENTER, MACALESTER COLLEGE,  
U.S.A.
- E19 F. 6.7 LORETTO HILTON CENTER, WEBSTER COLLEGE, U.S.A.  
Architects: Murphu & McKey  
Theater Consultant: George Izenour  
Acoustic Consultants: Belt, Beranek & Newman  
Structural Engineer: Albert Alper  
Machanical Engineers: Paul Londe & Associates
- E20 F. 6.8 JOHN F. KENNEDY HIGH SCHOOL, LONG ISLAND, NEW YORK,  
U.S.A.
- E21 F. 6.9 KENNECY JUNIOR HIGH SCHOOL, MATICK, MASS., U.S.A.  
Architects: Davies & Wolf, Freeman & Flansburgh
- E22 F. 6.15 & F. 7.15 WILBUR HIGH SCHOOL, WILBUR, WASHINGTON, U.S.A.  
Architect: Kenneth Brooks
- E23 F. 6.17 WARSON WOODS ELEMENTARY SCHOOL, WARSON WOODS,  
MISSOURI, U.S.A.  
Architects: Hellmuth, Obata & Kassabum
- E24 F. 6.19 KLEINSCHULHAUS BEI ZURICH, SWISS  
Architect: Jacques Schader



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## G L O S S A R Y     O F     T E R M S

- Administrative Area     Where administrators conduct their work. Facilities include principal's room, conference room, data center for students, reception room, counselling room, etc.
- Arts     The creative or expressive work of man, human skill on beauty (contrasted with the work of nature), such as drawing, painting, sculpture, etc. Facilities to be provided for the subject area are drawing room, studio, dark room, etc.
- Auditorium     A room or a building to accommodate an audience for lecture and performance.
- Booth     A small enclosed compartment where audio-visual instruments were installed for independent study.
- Business     A subject concerning official business practice, and runs through a variety of activities, such as the use office machines, bookkeeping, short hand writing, etc. Facilities provided for teaching in this subject area are typewriters, adding machines, duplicating equipment, tape recorders, etc.

- Cafeteria** A dining area in which students carry their meals from a service counter to tables.
- Cafetorium** A cafeteria combined with an auditorium. It is arranged to serve as a cafeteria as well as an auditorium.
- Carrel** A small desk with panel above its surface on three sides, designed for individual study.
- Classroom** Where a group of students who entered a school in the same year learn through individual contacts with other students and teachers. A classroom where the students are required to report every day is called a homeclassroom or homeroom (often in the elementary and high school).
- Cluster** A configuration of room elements of the same characteristics occurring close together. This may become a comparatively large building, such as a science cluster, etc.
- Commons Space** An ordinary space without any special characteristics, such as a wide hall or a corridor that can be used for multi-purpose.
- Communication** Subjects concerning with communicating, such as language. Facilities provided for teaching in this subject area are audio instruments, carrel for individual study, etc.
- Divisible Auditorium** An auditorium which can be divided into several lecture or teaching rooms.

- Elementary School A school for the first six to eight years of a formal education for children around the age of 6 to 11.
- Foldable Stands Stands that can be folded to the wall.
- General Space A open space used by students or communities, such as auditorium, gymnasium, library, etc. It is same as public space.
- Group Teaching Where students of the same level and ability are gathered together and taught under one or more teachers.
- Gymnasium A room or building equipped for gymnastics, sports, athletic, physical education, and possibly, community use as well.
- High School A secondary school that usually covers from grades 9 to 12.
- Homemaking Arts Same as home economics. The art of home management, including household budgets, clothing, child care, cooking etc.
- Industrial Arts The art of industrialized work on wood, metal and electronics. Facilities provided for this subject are tools, machines, workshop and possible an open yard.
- Instruction Commons A commons space used for instruction and teaching.
- Laboratory A room or a building equipped and used for

- scientific experiments, research, or testing in chemistry, physics, etc.
- Library** A repository for literary and artistic materials such as books, records, prints etc., kept for reading or reference.
- Lounge** A comfortable, furnished room or a hall to allow students or teachers to relax.
- Material Center** Similar to a resources area with the additional use as a teacher's working area.
- Middle School** Children will progress around the age of 9 or 10 from the primary school to a middle or intermediate school, which may cover three or four grades in the upper-elementary years, probably from grades 5 or 6 through to 8.
- Movable Partition** A partition that can be moved or operated manually or mechanically.
- Multi-Use Space** Same as multi-purpose or all-purpose room. A space which can be used for any function.
- Music** The art of organizing sound, so as to elicit an aesthetic response in a listener, including vocal and instrumental.
- Operable Partition** Same as movable partition.
- Partition** A wall that divides a space to several spaces.
- Physical Education** Subject which teaches gymnastics, athletics, sports and body-building exercises, espicial those performed with special apparatus in a

gymnasium. Facilities provided for teaching are gymnasium, apparatus, courts for ball games and stadium.

- Primary School** A school, usually comprising the first three or four grades of elementary school and sometimes kindergarten, for children around the age of 6 to 8.
- Resources Area** Where an available supply of materials for teaching and reference that can be drawn upon when needed.
- School** An institution for instruction and learning.
- Science** The observation, identification, description, experimental investigation and theoretical explanation of natural phenomena, such as physics, chemistry etc. Facilities to be provided for this subject area are laboratory, greenhouse, experimental instruments, etc.
- Secondary School** A school between elementary school and college.
- Seminar Room** Where a group of students may study a problem and meet for discussion with one or more teachers.
- Sound Transmis-  
sion Class, STC** The STC rating is an expression of the effectiveness of the partition in the insulation of common sounds.
- Social Science** The study of human social structure and relationships. Facilities provided for teaching are audio-visual instruments. It can be taught in a general classroom.

- Space Divider A panel used to divide space.
- Special Room A room where special subject such as science, arts, etc., are taught; or where special teaching aid is provided to help slow learning students.
- Special Subjects Special study on a specific environment or function, such as subjects in science and arts.
- Stand A place where spectators or viewers may watch the action at a stadium or a gymnasium.
- Teaching Planning Center Same as Teaching Station, Teacher's Center, a space which provides materials, teaching aids to allow the teacher to work on teaching preparation. Usually it is located in the administration area or adjacent to classroom.
- Team Teaching Where more than one teacher teaches a single subject to both large and small student groups.
- Theater-Auditorium An auditorium for the presentation of motion pictures and dramatic performances.
- Theater-Concert Hall An auditorium for motion pictures and musical performances.