

1.

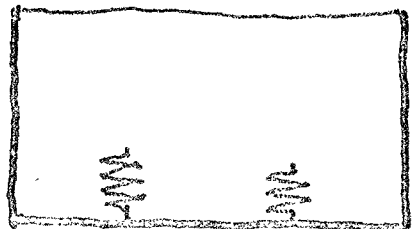
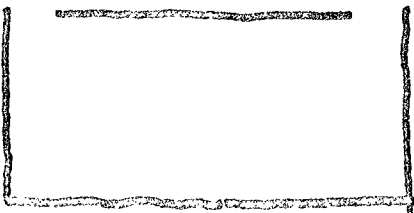
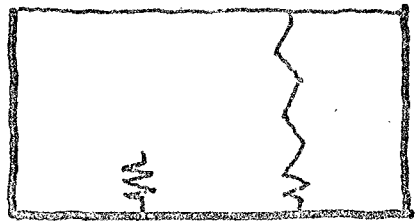
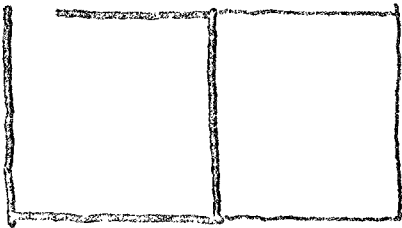
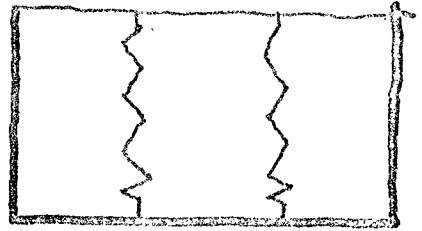
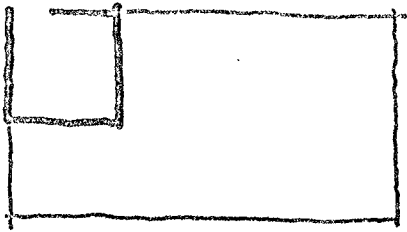
## C O N C E P T     O F     F L E X I B I L I T Y

Flexibility is a characteristic of allowing a range of change to suit various purposes. There are synonyms that also express the word flexible, such as convertible; divisible; sub-divisible; movable; removable; changeable; multi-purpose; and more of the same.

Flexibility in architectural design has several features, such as structural, spacial, finish, mechanical and electrical flexibilities ((22) p.154, (23) p.105).

According to different requirements, flexibility should provide for:

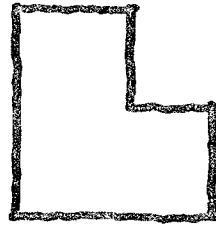
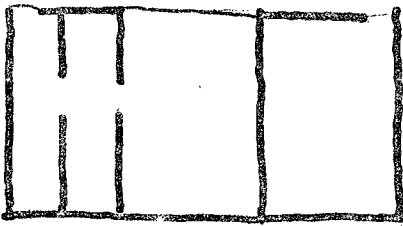
- a. Adaptability:- Spaces providing varying degrees of changing capability to fit different teaching situations. Architecturally speaking it can be varied to different shape and form to suit different functions.
- b. Immediate change:- Reducing, expanding space -- to separate or combine groups of activities by rapid change of space size and configurations by virtue of movable partitions that can be handled



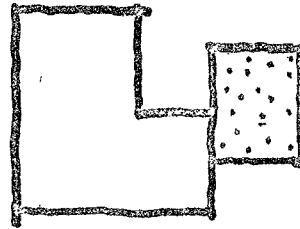
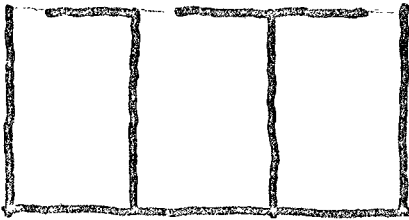
(1) Adaptability

(ii) Immediate Change

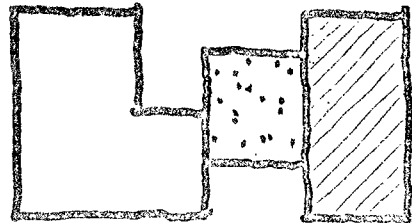
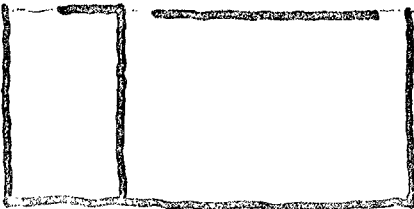
Fig. 1.1 Concept of Flexibility of Building



original



1st stage



2nd stage

(iii) Large-Range Changeability (iv) Expansion

Fig. 1.1 Concept of Flexibility of Building (cont.)

or operated by the school maintenance crew, or by electronical or mechanical devices at a moment's notice.

- c. Long-range changeability:- Facilitate changes -- in the teaching program, redistribution of students, teachers or equipment. After a period of years the structure in the existing school plant can be changed; removal of non-load-bearing segments can be done during the summer months, during a week's vacation period, or over a weekend.
- d. Expansion:- For future expansion -- to add rooms, furniture, and facilities to the main school plant to meet future requirement. ((16) p.35)

Items "c" and "d" indicated above involve the changing of structural, mechanical and electrical features, but "a" and "b" can be achieved simply by movable furnishings such as movable furniture and movable partitions. Items "a" and "b" specially item "b" will be discussed later in this thesis in the following way:

- a. Flexible use of one space, such as regrouping, dividing to two or more spaces, change in attitudes, and duplicate use of space.
- b. To combine two or more spaces into one large space.
- c. To regroup, combine and divide different functional space(s).

As the volume of this thesis is limited, "c" and "d" features are excluded.

The above concepts of flexibility imply physical change after the school has been built. Any of the concepts can be useful and meaningful if we can determine what degree and variety of flexibility we want and what we are trying to achieve with it. On the other hand, any of these concepts can be used to solve indecision about educational planning and required facilities.

The primary benefit of the flexible concept, as indicated, often may not be savings in original construction cost, but the gaining of important flexibility to meet changing needs, and particularly, the savings in cost of operation and ownership. (3) (11) (16) (25) (26)

2.

NECESSITY OF FLEXIBILITY IN  
SCHOOL DESIGN

One of the most annoying and universal forces at work in the last half of the 20th Century is OBSOLESCENCE. All about us we see machinery, equipment, and buildings that are obsolete long before they are worn out. Obsolescence is one of the greatest contributing factors to waste in our society at this time. No institution or equipment is free from it. One should plan to avoid this factor in future planning for a school building.

Thousands of children will invest precious time in schools. We have to relate our thinking to the planning of instructional institutions which would provide the most judicious use of instruction time, teacher talents, and technological advances.

Transitional steps in education must be tied firmly to the values of past experience, but just as firmly they must be related to the demands of the future. A human being's future rests on today's planning for the fullest development of the resources of his youth.

Besides, not all teachers are alike. Each has his

own special interests and skills. Schools should be planned to take full advantage of these unique teaching skills and to provide the means for the teachers to work together for more effective instruction.

Furthermore, the rules of education in these days are changing dramatically in response to the evident needs for philosophical and theoretical aspects.

Therefore, in order to combat obsolescence in school building, to give youth a free learning environment, to accommodate these unique teaching skills, and to suit educational changes that come along, we should endeavor to build into schools FLEXIBLE features which will allow us to accommodate the above indicated aspects.

In addition, flexibility can provide independent study spaces where students can learn largely by and for themselves. It gives more opportunities for individual instruction. By increasing individual instruction, a student's potential can be determined more accurately, and can be guided along an appropriate course of study tailored to his own needs. He is also given a feeling of responsibility for his own learning.

(3),(4), (14)

3.

A C H I E V E M E N T      O F      S P A C I A L  
F L E X I B I L I T Y

The well-designed school must serve the needs of the educational program -- student, teacher and administration. The school's educational specifications must meet today's needs as well as those of the future. Of the two needs -- the first is undoubtedly the most difficult to satisfy since it deals entirely with the elusive elements of personal problems. It involves philosophies and theories, opinions and attitudes, experience and conjecture. Out of the frustration and indecision in trying to establish a goal-oriented plan of educational program, one way has emerged from the plannings of the architect -- the building of spacial flexibility into the school. ((3) p.17)

Spacial flexibility can be for a variety of teaching situations. It is obvious that this requirement can only come after school planners have decided on the most basic pattern of their educational program. The school curriculum, student grouping patterns, teaching techniques, the use of tools to support the teaching effort or even general administrative organization can directly effect the design of the entire school unit and its parts. The latter part of the responsibility for



flexibility in school design, therefore, rests with the planner of the educational program. A creative plan in programming must precede creative design of the school facility.

Where administrators supply these details to architects, the combined effort can give an ideal result. These are not necessarily high-cost or high-quality schools, though it is important that you should get more than what you pay in the space. The greatest economy any planning groups can anticipate is the economy that comes from the efficient and flexible use of spaces and facilities.

For instance, a classroom might be divided into several seminar spaces or combined with the others to form a large group teaching area, and is thus organized for multiple teaching purposes by the installation of facilities for different subjects. An arts teaching area might be combined with industrial arts and homemaking arts; and auditorium might be divided into several teaching areas, and possibly might be combined with gymnasium, or food service area; a little-theater facility might be useful for lectures, demonstrations, possibly a television studio facility, and a music room; food services might be supplied to several more pleasant, intimate dining areas which may also serve as teaching areas. (3) (4) (14)

Flexible spaces can be achieved simply by the installation of furniture and furnishings that can be moved or removed, stacked, nested, rearranged and grouped in a variety of combinations of space-within-space.

There are instances, of course, where there may be

no need for complete separation of spaces; the division may be accomplished by visual or psychological devices, such as the narrowing or widening of a room, a change of ceiling height, the partial obscuring of a vista by decorative screens or planter boxes, the inclusion of cells or alcoves, or even merely a strategic arrangement of furniture. But in case where a more complete physical separation and a sound barrier are called for, an operable partition is usually required, so that rooms can be quickly subdivided for differentiated use or opened up into adjacent areas for added capacity.

This thesis is trying to demonstrate how to use the possible flexible spaces in a school building; how to combine and divide a space; and how to rearrange a space and a space-within-space. Most of these features were adopted from existing school buildings and were rarely created by the author. The ideas discussed here can be applied to school planning as well as to the renovation of an existing school building.

4.

FLEXIBLE SPACES IN GENERAL  
TEACHING AREA

General subject is a course that needs no special facilities or aids during teaching, and is generally taught in a regular classroom in the elementary and high schools.

Modern research has shown that the traditional classroom alone no longer provides the most satisfactory learning environment, especially in the elementary and secondary school. ((3) p.15). What is needed is a flexible arrangement which will provide for the following:

- a. Large group instruction where students learn from expertly prepared presentations of the subject matter;
- b. Small group instruction where students learn through discussion with teachers and other students;
- c. Independent study where students learn largely by themselves.

Flexible facilities enable students to meet in small groups of fifteen or less to examine and discuss more fully the concepts and ideas gained in large-group presentations. (3)(4)

The possibility of flexible spaces in general teaching,

such as the flexible use of one space, the combination of two spaces into one large space and to a cluster or a wing, will be discussed as follows:

#### 4.1 SEMINAR ROOM

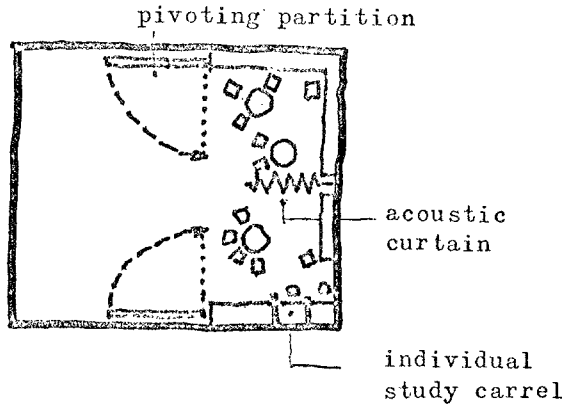
A seminar room is a place provided for a group of students to study a problem and to meet for discussion with one or more than one teacher. It is seldom provided in a small school. Where it is provided, it is usually a classroom rather than an independent one.

Seminar spaces will be common facilities in a school. Conference and seminar rooms will be more casual, less restrictive than standard classrooms, and may provide space and facilities for work projects and teaching aids. These spaces should distinct atmosphere as living or sitting rooms, etc. Partitioning devices should allow the expansion or enclosure of space-within-space.

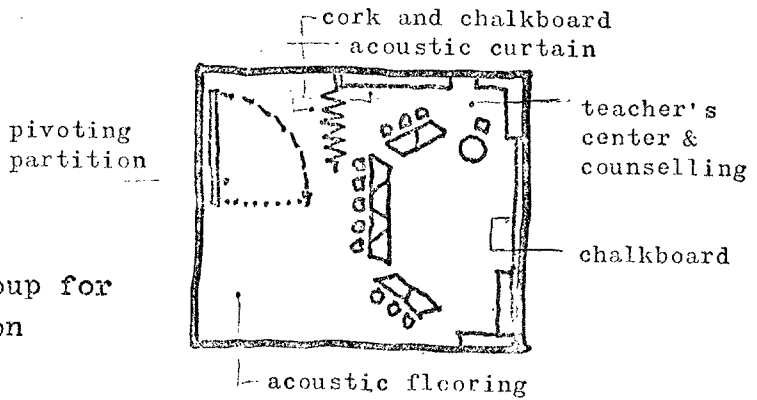
Small seminar spaces for groups of two to six persons are scaled for small group projects; discussion; individual study and team activity; enrichment programs for fast and slow learners or make-up sessions. Space is informal, non-institutional, giving size to a "study" atmosphere. The total area can be expanded and contracted by adjustment of space dividers and partial acoustic drapery to baffle sound between study and discussion groups. ((3) p.58)

General conference and seminar room for groups of twelve to fifteen persons are more casual and less restrictive

(i) Seminar Group for 2-6 Person



(ii) Seminar Group for 12-15 Person



(iii) Seminar Group for 20-25 Person

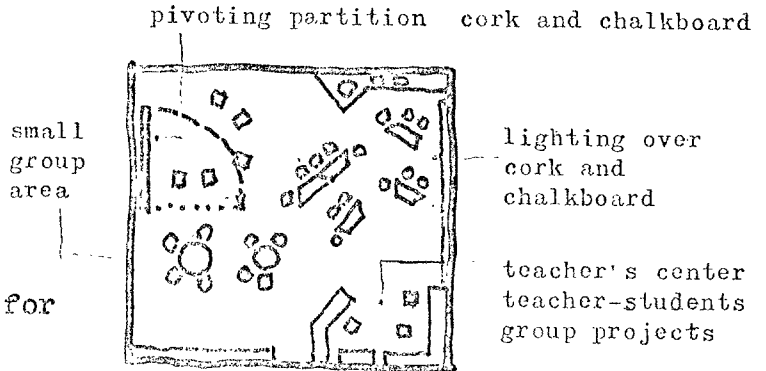


Fig. 4.1 Arrangements of Seminar Room

than the traditional classrooms, thus encouraging close contact between teacher and students as well as exchange between the students in team-learning sessions. Acoustic curtain dividers and movable space dividers can provide varying degrees of sound isolation and visual privacy between areas within the total space.

The sketches in Fig. 4.1 show some examples of well arranged seminar spaces. ((3) p.58 - 59)

#### 4.2 CLASSROOM

A classroom is a place where students can learn through individual contacts with other students and teachers. In an elementary or a high school, pupils are required to report each day to a classroom known as a homeclassroom or a homeroom.

In a traditional classroom, student were taught equally, but in a modern one they are often taught in groups accordingly to their reading skills, maturity, interest factors, achievement and special needs.

At the same time it is the responsibility of each instructional team to group and re-group these students to the better learning and instructional environment. The groups are planned to give each student the best possible learning advantage. Groups can be arranged for any purpose as determined by need at any given time. Flexibility allows the teachers to work with groups of one to one hundred students. Group teaching facilities allow students to attend subject matter presentations, to view appropriate educational films, and to listen to public

speeches. A broad variety of modern visual equipment can be used to aid students in their introduction to specific bodies of knowledge.

With this teaching technique, students become involved in decision-making and problem-solving, with freedom to make mistakes and the careful guidance to learn from them.

Possible arrangement of teaching area, shapes of classroom and combination of classrooms are discussed as follows:

#### (1) Rectangular Classroom

Rectangular classroom has often been used as traditional and regular classroom. This shape of classrooms for 30-35 students still occupy the majority of space in schools today. In larger schools each room may be assigned to one or two teachers for one or two subjects only, with permanent installation of teaching aids and equipment in that room. The teaching-learning process requires great variety of groupings for students who vary in abilities. The basic rectangular shape hardly suits the need for varied grouping of students. But there is still some opportunity for rearrangement of the room facilities. At least, those standard classrooms can be rearranged for somewhat smaller groups of 20-25 students. Sometimes, reorientation of students seating will improve viewing of demonstrations, and instruction, and will give better group teaching space. (3)

If the combination of classroom unit is in good

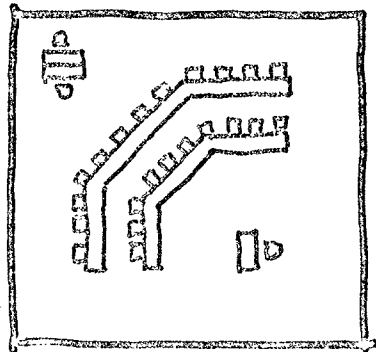
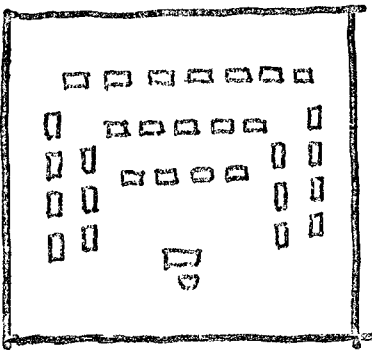
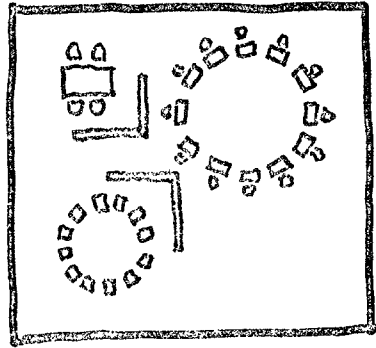
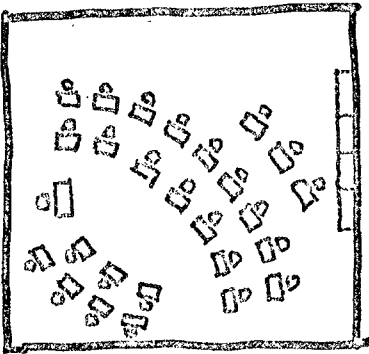
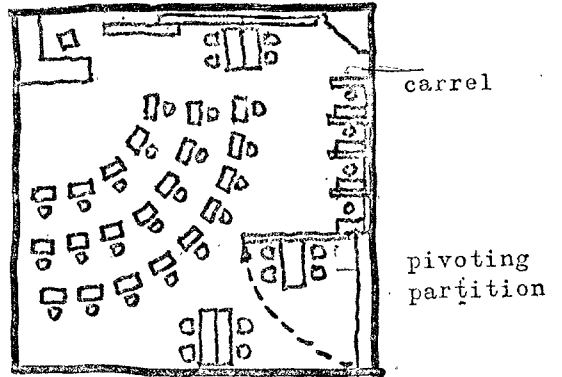
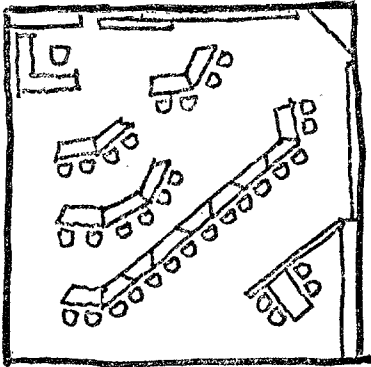


Fig. 4.2 Arrangements of Group Teaching in One Unit of Classroom



arrangement, it will provide more flexible group teaching space from small to larger group space.

To provide such spaces, flexible facilities must be adopted, such as movable and pivoting partitions, swing-out carrels, and movable furniture. Movable furniture allows great flexibility of room arrangements. Swing-out carrels at the wall provide individual study areas within the total classroom space. Pivoting partition offers visual privacy for small group projects or study. Movable partition divides the space as visual and acoustic barrier.

Sketches (Fig.4.2) show different arrangement of small group teaching in one unit of classroom. ((3) p.61,62 (4) p.48)

The large group spaces -- two classroom divided by a folding room divider which easily opens to form a single large classroom area. ((3) p.63) In the sketch the furniture arrangement allows for a minimum of reshuffling when the spaces are

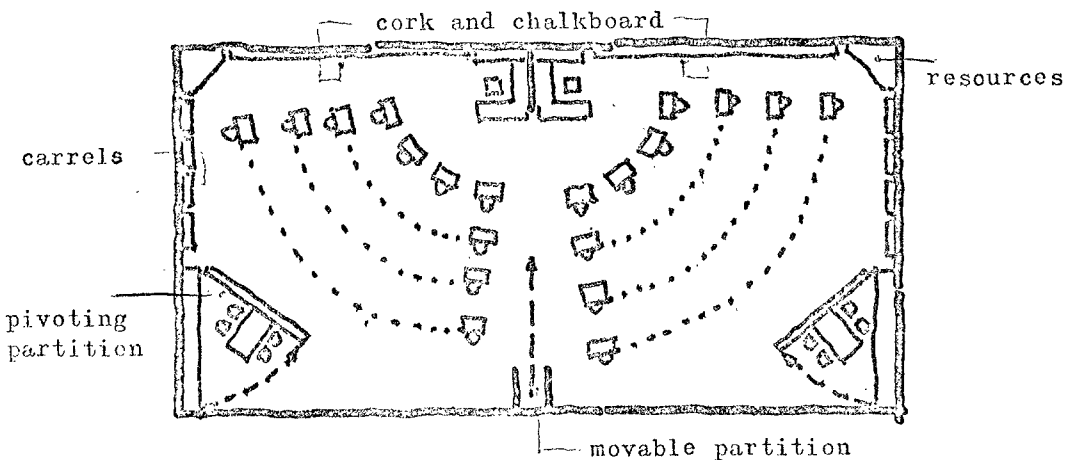


Fig. 4.3 Arrangement of Two Units of Classroom

combined or divided. This arrangement is suggested for large group instruction, screen and televised instruction and other team teaching techniques. Note that each unit retains details or resource centers, study areas, special area and chalkboard lighting, etc., as shown in previous sketches.

Clusters of classroom units can allow for varying group sizes of 30, 60, 90, 120, 150 etc. The sketches followed are real examples for large group teaching. Most of them are performed by several types of operable partitions and movable units or furniture.

The following sketch (Fig. 4.4) shows four rectangular classrooms combined into one cluster.

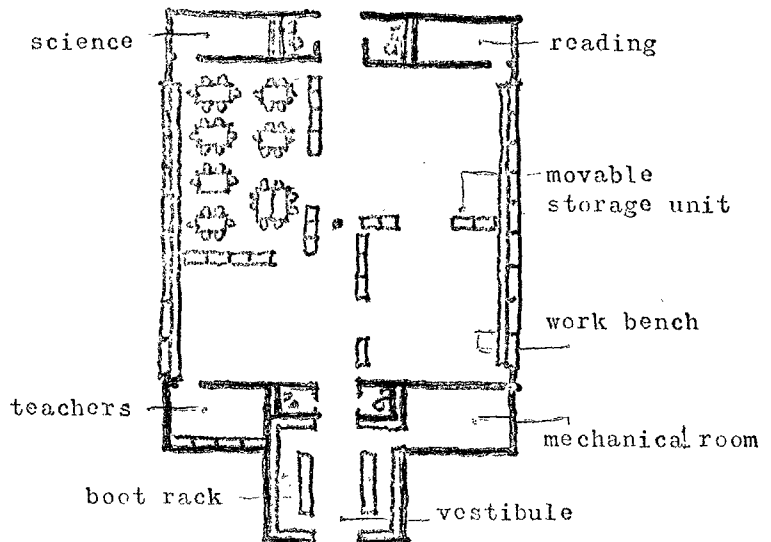


Fig. 4.4 Arrangement of Four Units of Classroom

The classroom is open space in its simplest form,

enclosing the equivalent of four average classrooms. It is entered through a vestibule containing individual cubicles for children's coats and other belongings.

There are no other adjunct spaces, though by drawing a fabric curtain across the width of the room and rearranging the movable furniture to separate room space and visual sight, the absence of interior partitions has enabled an enthusiastic teacher team to develop a highly creative program within the open space. ((9) p.18)

Another four-classroom combination examples can be seen as followed:

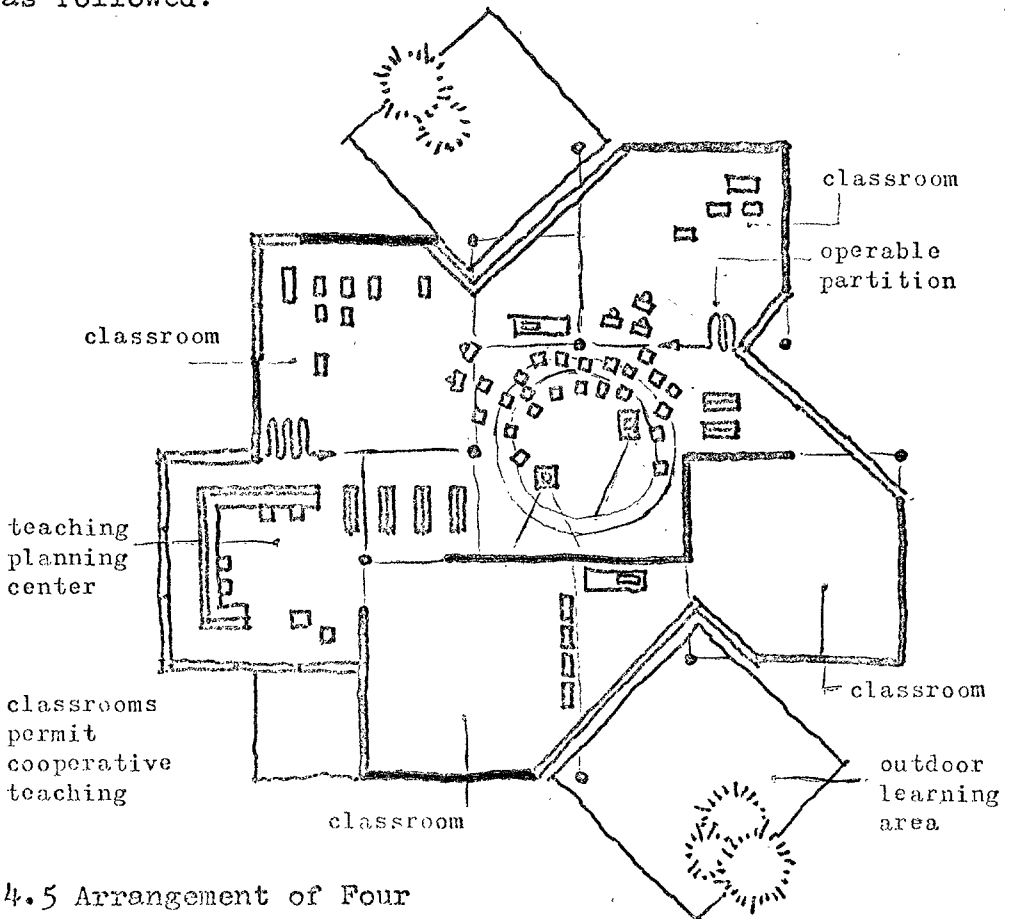


Fig. 4.5 Arrangement of Four Units of Classroom

Traditional classrooms combined in a ideal manner make the possible group teaching spaces illustrated above (Fig. 4.5). Each of the four classrooms is enclosed within its own four walls. Operable partitions link the different teaching area so that class activities can move easily, overflowing from one group to another or into the shaded central space. The partition can be drawn around two or three classes gathered together for a lecture or demonstration in the central area. This arrangement produces smaller enclosed spaces for groups of students working on special projects. ((4) p.48)

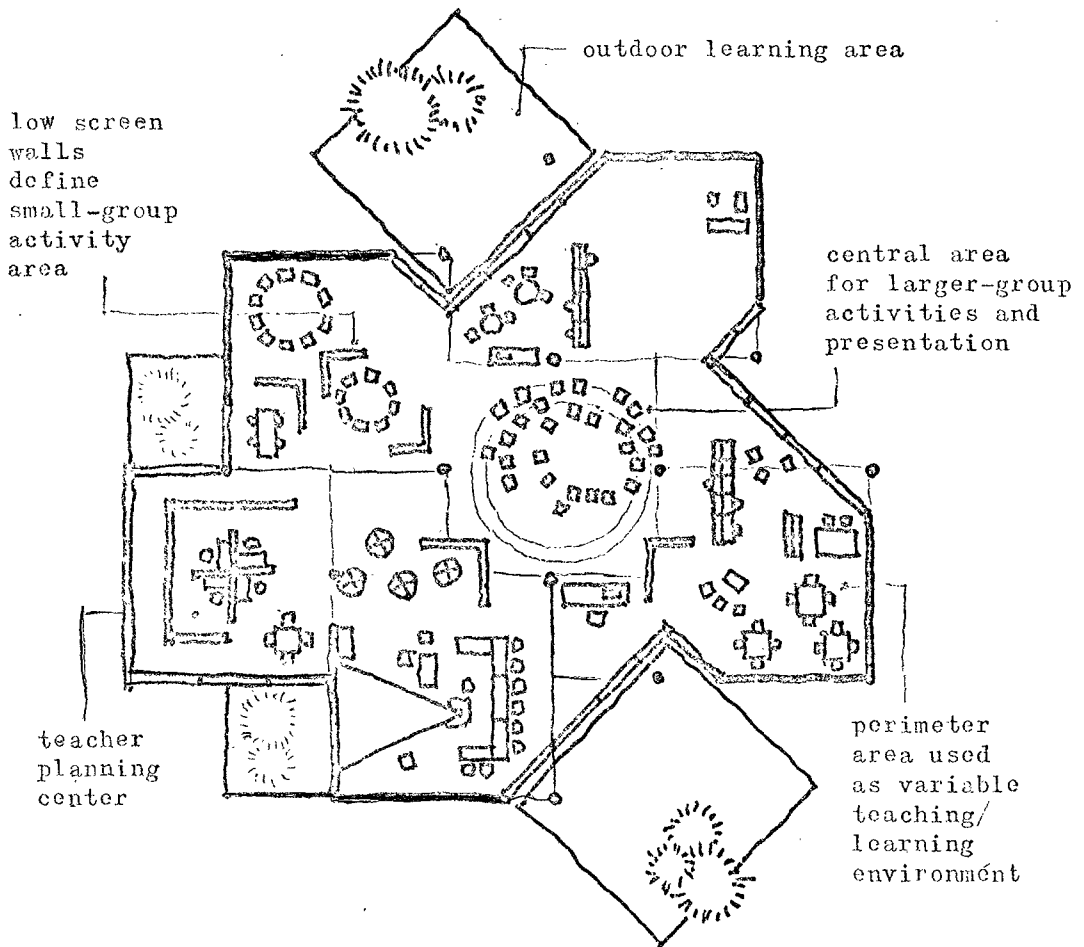


Fig. 4.6 Arrangement of Four Units of Classroom

The sketch (Fig. 4.6) shows the ultimate in fluidity and flexibility. There are no fixed walls nor even operable partitions: the whole space is thoroughly open to permit the easy interchange of teachers, pupils, and resources. Low partition-screens improvise small spaces as needed to contain or screen activities. Complete acoustic isolation is not necessary as general sound dampening is produced through the use of carpeting, the space separating the learning groups, and the shape and texture of ceiling planes. ((4) p.48, (20) p.358)

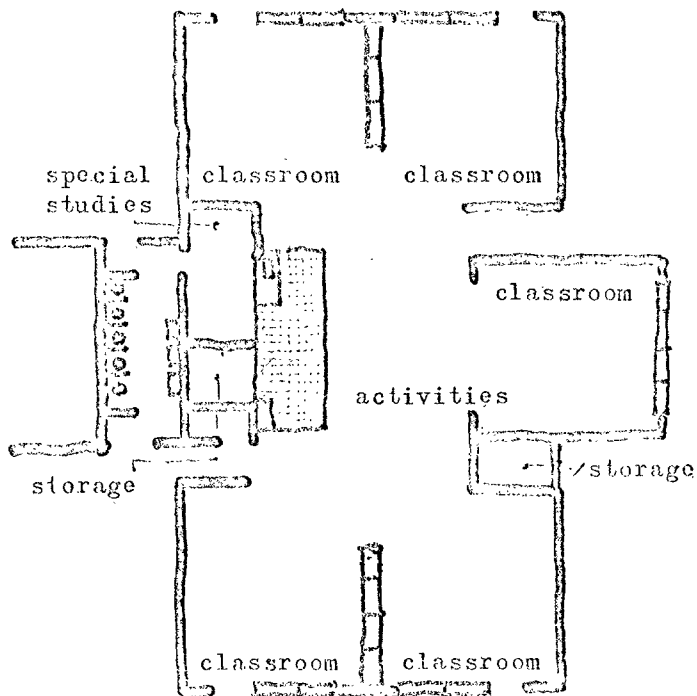


Fig. 4.7 Arrangement of Five Units of Classroom

An example of a five classroom combination is shown below in Fig. 4.7, which consists of five open regular classrooms as a cluster (called wing). A central-activities area as a common

space provided in the center of the cluster. The teaching station is located in this space.

One of the five classrooms is set apart from the others in an alcove off the common area. This was done to give teachers more privacy if this is preferred. But in two cases, teachers who choose or originally chose the separate classroom have since voluntarily moved out into the open space.

There are two panel-type operable walls set up to provide a partial visual barrier between pairs of teaching stations. The walls can be added if more complete separation is wanted.

Storage room for instructional materials and special studies rooms which double as a teacher work room are provided also in this cluster.((9)p.20)

The following sketch (Fig. 4.8) shows the arrangement of a six-classroom cluster. A central commons is surrounded by six open-spaced classrooms. Within the large unit, teaching stations are lined up on both sides of a central commons which serves as an instruction and materials center and large-group space.

However, there are no adjunct spaces except for a storage, preparation room off the commons, which has operable walls to partition off areas for small group instruction or special activities. The teaching station at the upper left of the plan can be wholly enclosed; the station at the lower left can be walled off on the side next to the commons, The operable walls can be drawn along the full length of the building,

enclosing one standard-size classroom and one double classroom. Ceiling tracks have been provided on the other side of the room to receive similar walls if and when they are wanted. ((9) p.21)

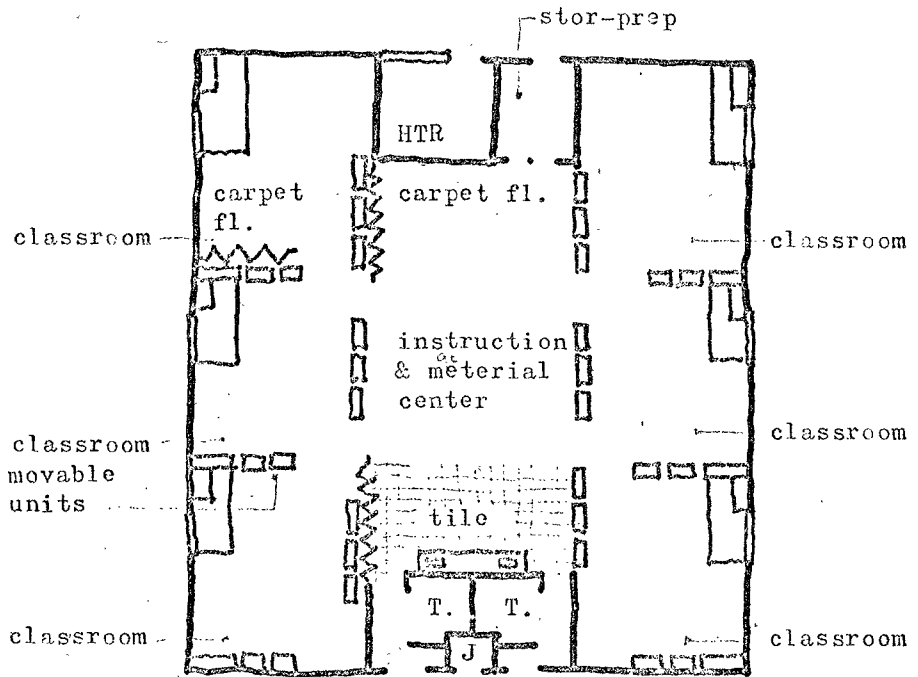


Fig. 4.8 Arrangement of Six Units of Classroom

## (2) Triangular Classroom

Classrooms and spaces that break from the traditional box shape is functionally superior to the rectangle and also serves the purpose of variable group arrangements. Whether as a smaller seminar space or a traditional classroom group for 25-35 students, as shown in the sketches (Fig. 4.9), the triangular space can effectively employ space divider for reading and reference areas. The teacher's center is at the natural point of focus where television and projection screen are also located within the 90° area of the student's viewing angle.

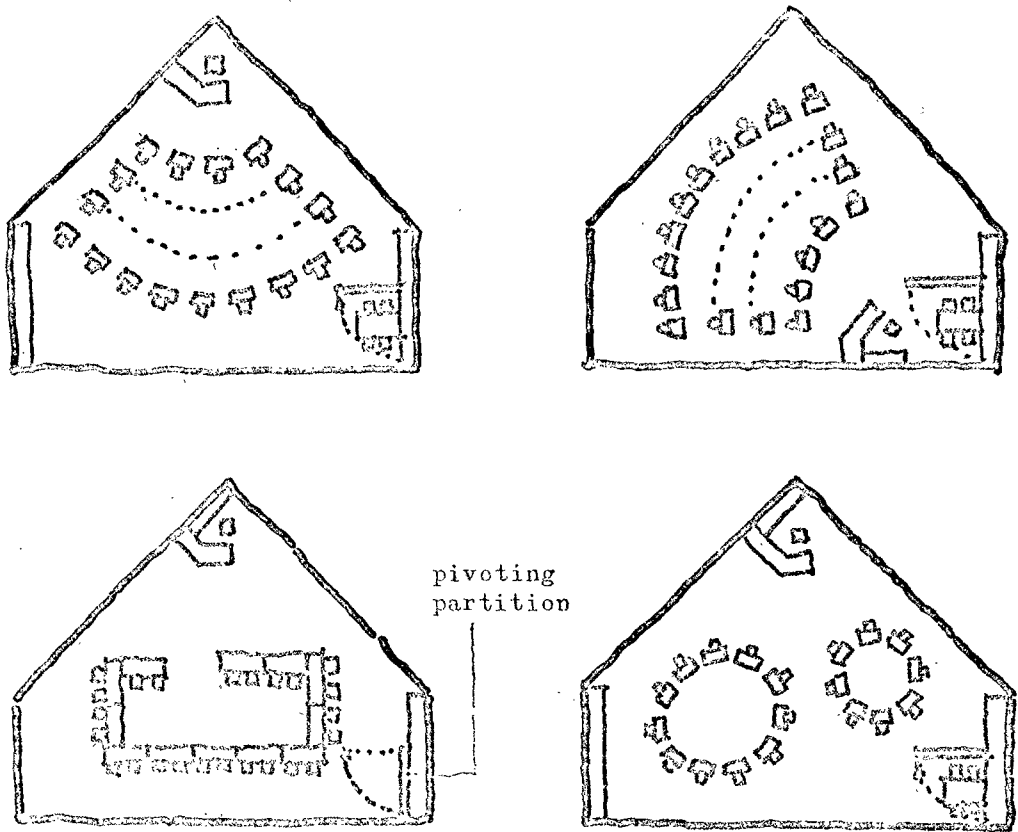


Fig. 4.9 Arrangements of Group Teaching in One Unit of Classroom

Triangular shapes work effectively together in a combination of two units of classrooms for larger group sections of 40 or more students. When the combined area is opened for a screened or a televised instructional course or lecture, one teacher can speak to or supervise the full complement of students with ease. Acoustical treatment of the floors by carpeting is a major step toward reducing the noise made by the move of furniture, dropping of books and pencils, etc. Soft floor coverings along with furnishings, color and irregular room shape work together so as to break from institutional visual



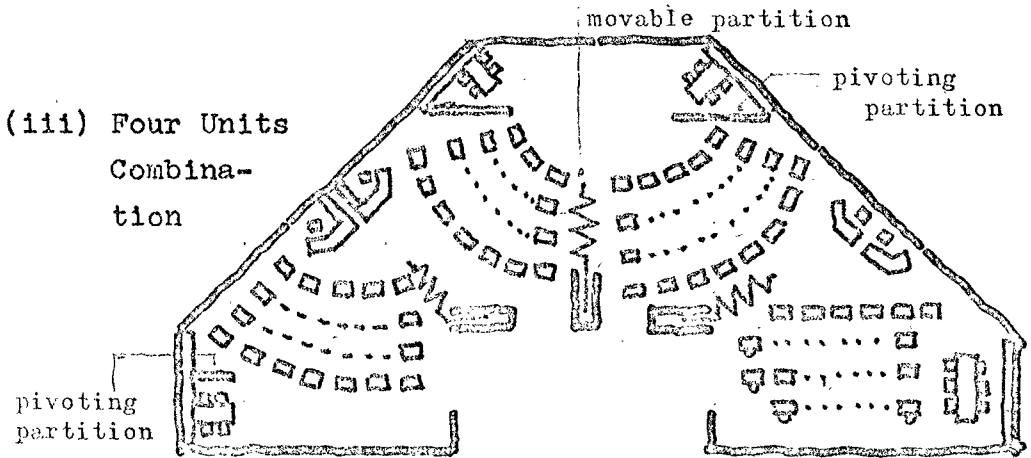
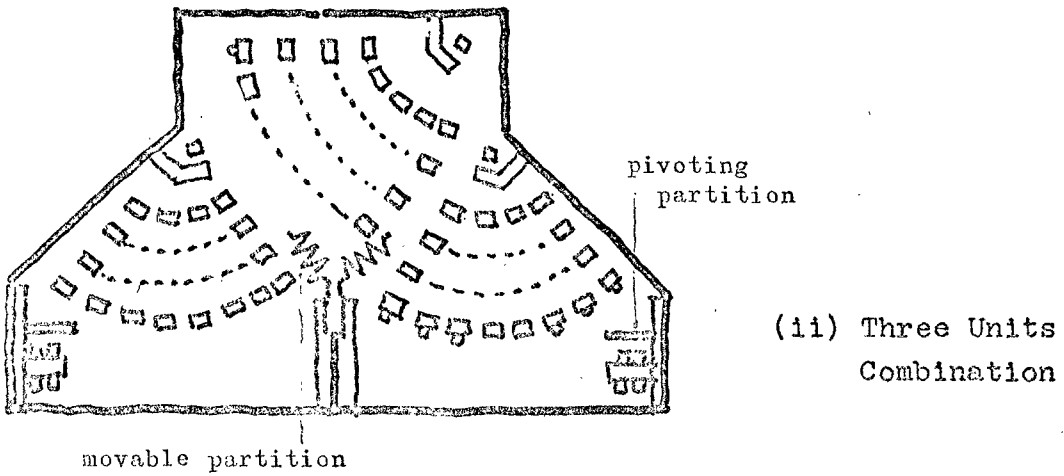
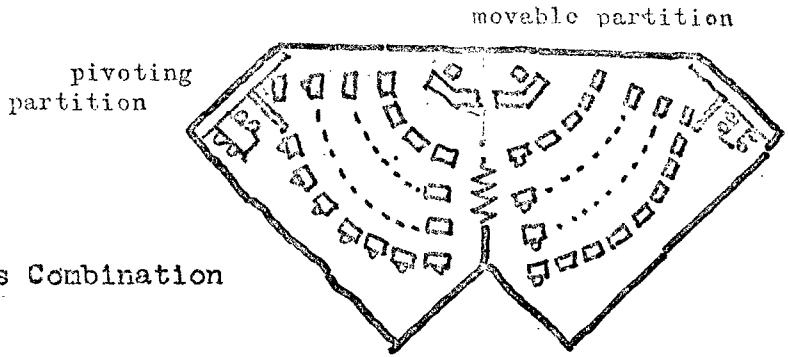


Fig. 4.10 Arrangements of more than Two Units of Classroom

effects.

When more than two spaces are adjacent and equipped with operable dividers, there is opportunity to design the focal unit with special demonstration equipment, lighting, etc.

The sketch (Fig. 4.10) of three units shows combination for large group lecture or screen, television space for 90-120 students located for proper viewing by each section of students. As these total spaces grow larger, placement of the audio speakers, balance between speakers and reverberation time must be more carefully controlled for audio intelligibility.

((3) p.66-73)

All of the advantages of the individual and combined space groupings can be realized and even extended when clustered around a central audiovisual resources core. Such a combination might be a complete school unit in itself, a large school or a school-within-a-school. Note the use of rear screen projection equipment for visuals distributed to various rooms from the central location.

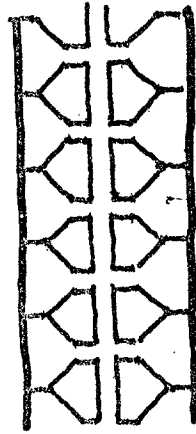
The following sketches (Fig. 4.11) show several ways to combine triangular-shaped classroom to cluster or wings of school building. ((3) p.67, 68)

The schematic drawings, Fig. 4.12 (i), show the adaptability of space and the present plans for its use. This shows an arrangement with basic four-classroom units which is designed to provide optimum seeing and hearing from all quarters. The three rectangles in Fig. 4.12 (ii) show the flexibility and the concept of a typical wing. The rectangle at left (a) shows the basic area, without fixed interior partitions. The diagram

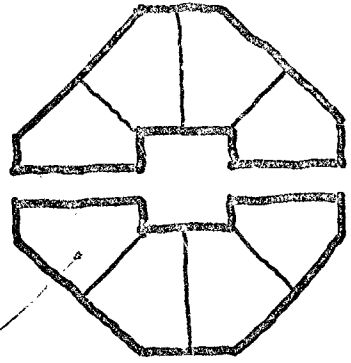
typical  
single  
loaded  
corridor



typical  
double  
loaded  
corridor



one unit  
classroom

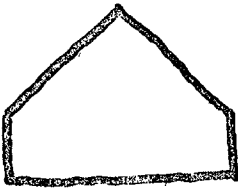


four or eight units  
combination

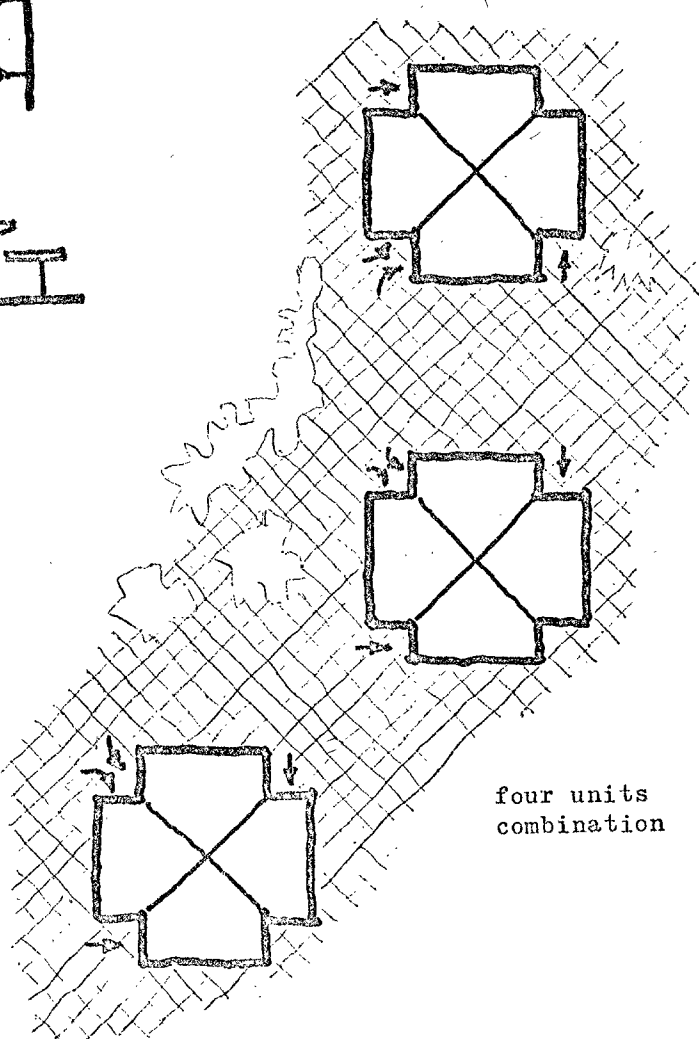
linear  
combination



section

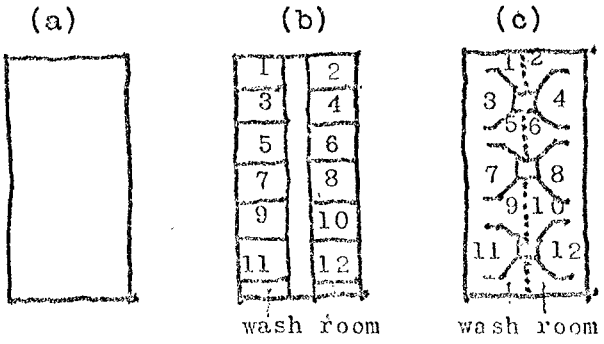
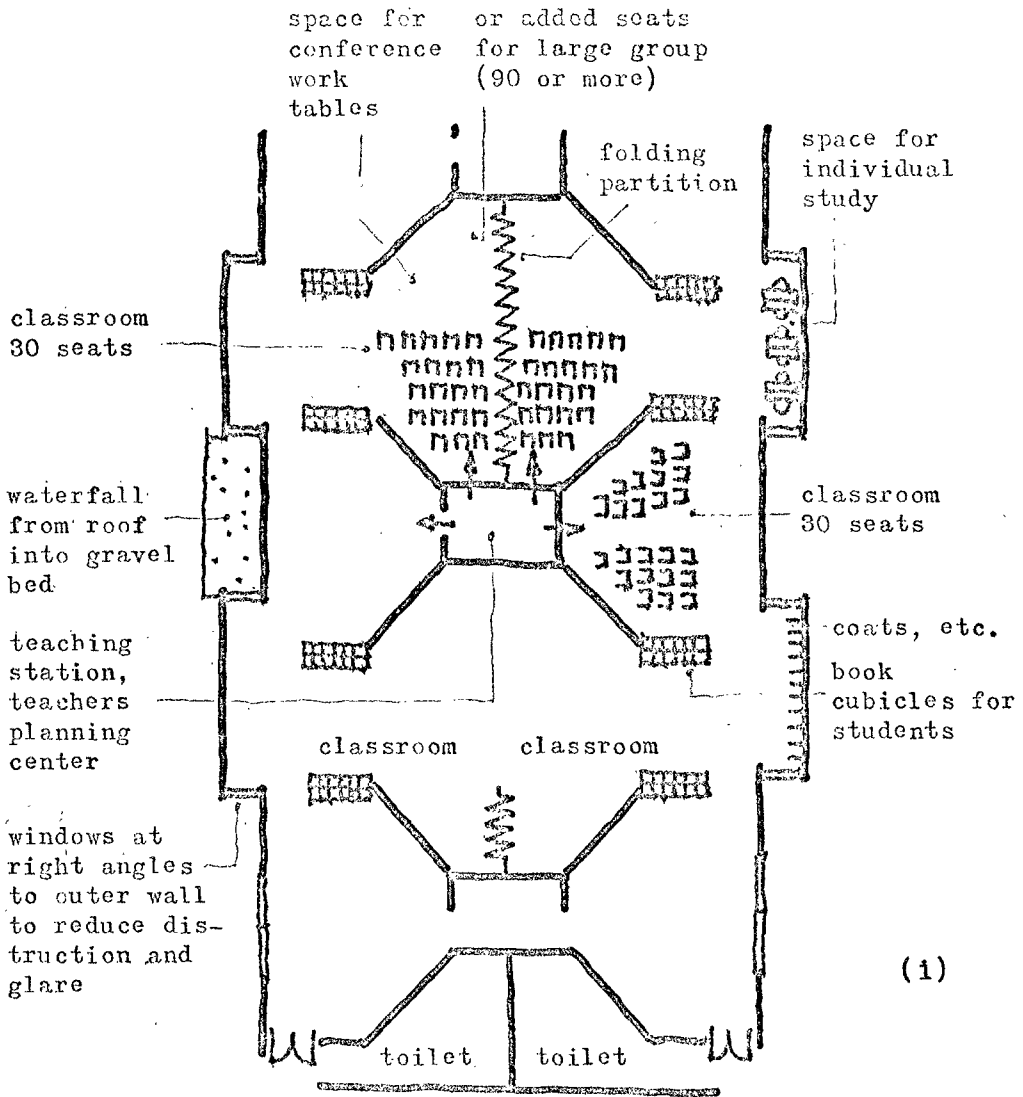


classroom unit



four units  
combination

Fig. 4.11 Schemes of Combination of Triangular Classroom



(i)

(ii)

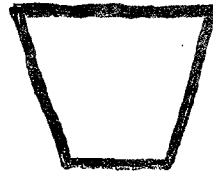
Fig. 4.12 Scheme of Dividing Triangular Classroom in A Rectangular Cluster

at right (c) shows partitions arranged for 12 classrooms with solid lines representing demountable walls and dotted lines representing folding partitions that can produce double classrooms within minutes. Squares in this diagram represent teachers' planning centers, essential to the team teaching which will prevail in the middle school. The central diagram (b) show the wing arranged in a traditional way to accommodate a conventional program of instruction with 12 standard classrooms opening to a double-loaded corridor. It can be seen readily that the arrangement at the right (c) offers more flexibility in the efficient use of space than the conventional arrangement (b).

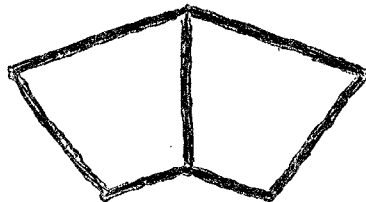
(3) Trapezoidal Classroom

Trapezoid shape is an ideal shape for using audio facilities in an auditorium. Its arrangement for group teaching is similar to that of a triangular classroom. In combination, it hardly differs from a triangular one.

The following sketches (Fig. 4.13) show the unit and its combination.



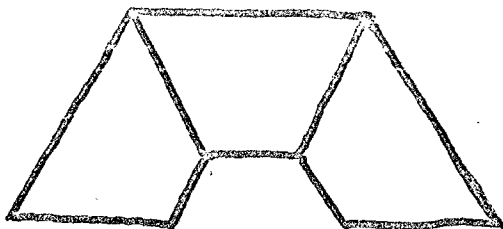
(i) One Unit of Trapezoidal Classroom



(ii) Two Units of Combination

Fig. 4.13 Trapezoidal Classroom and Its Combination

(iii) Three Units of Combination



(iv) Four Units of Combination

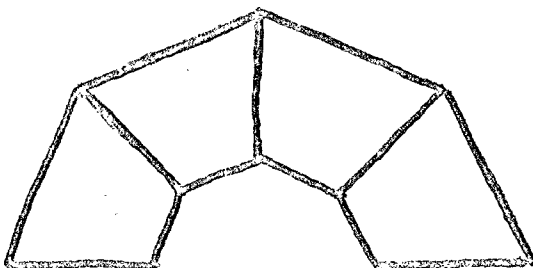


Fig. 4.13 Trapezoidal Classroom and its Combination (cont.)

A real example of flexibly arranged combination is shown as follows:

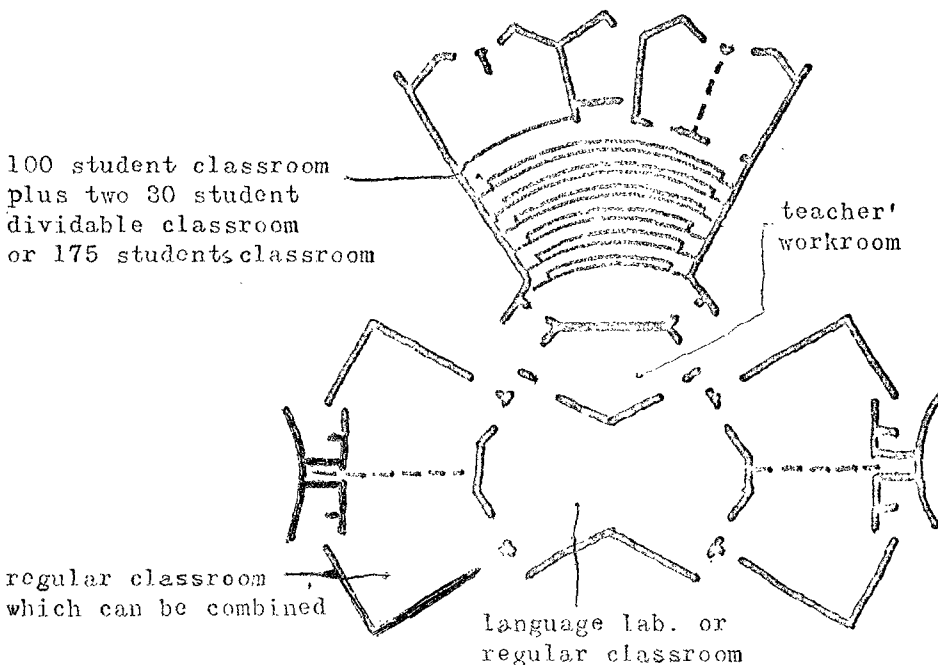


Fig. 4.14 Arrangement of Two Units of Classroom

The sketch shown above (Fig. 4.14) is a two units combination. Its arrangement allows for large group instruction, small group discussions, and independent study. ((6) p.6)

The sketch shown below (Fig. 4.15) is a three units combination.

The open classroom clusters are "tri-pods" made up of three teaching stations shaped so that each has three walls for vertical work surface and display, but each station opens to a common participation area in the center. Clusters are paired with toilets, mechanical spaces, and storage in between, and linked via covered walkways to a central unit housing the administrative suite, library, instructional materials center, and remedial reading room.

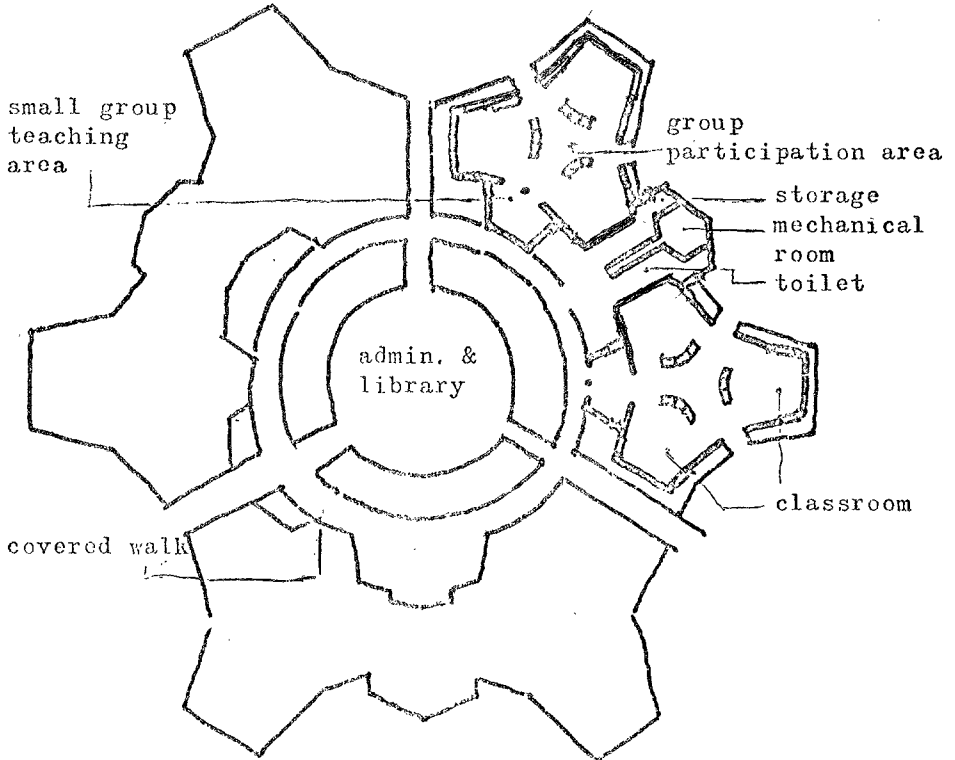


Fig. 4.15 Arrangement of Tree Units of Classroom

The main entrance to each cluster is through a foyer which doubles as a teacher workroom and small-group room for art, science, and other special activities. The foyer contains a sink and storage units and can be divided down the middle by a curtain, forming two separate areas. ((9) p.23)

There is an example which consists of ten trapezoid classroom grouped into circular "pods" surrounding a commons or assembly area as well as teacher's work area. Between two classrooms is a movable wall which allows the rooms to be converted instantly into large rooms for lectures, films, testing, etc. This arrangement of classroom space ( the movable walls and the teacher planning and work area ) means a better program of instruction for all students.((6) p.5)

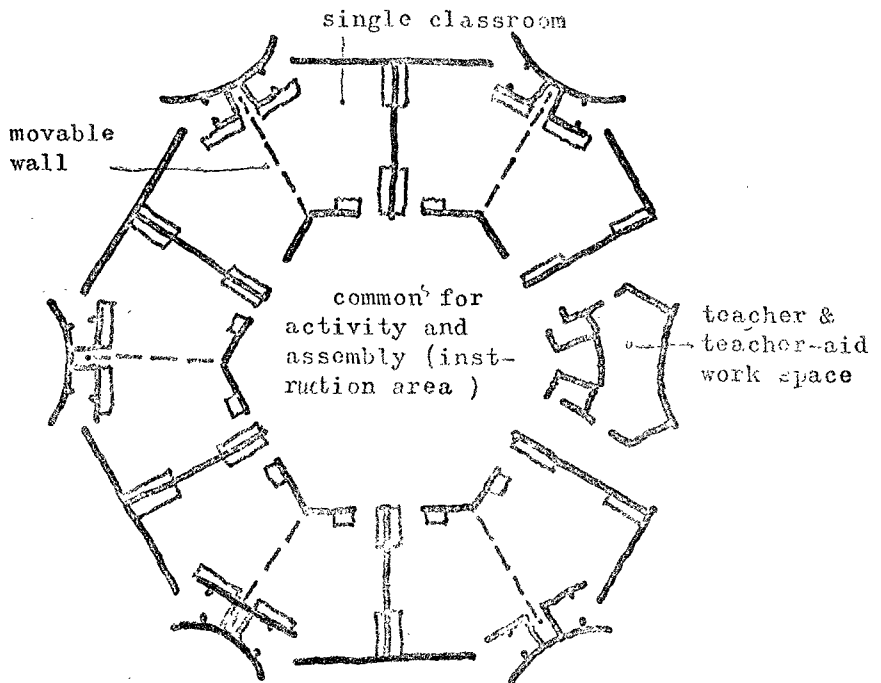


Fig. 4.16 Arrangement of Multi-number of Classroom



(4) Hexagonal Classroom

Hexagonal shape can be adopted as an ideal group teaching space. The arrangement of groups in a classroom can be shown as follows: (Fig. 4.17)

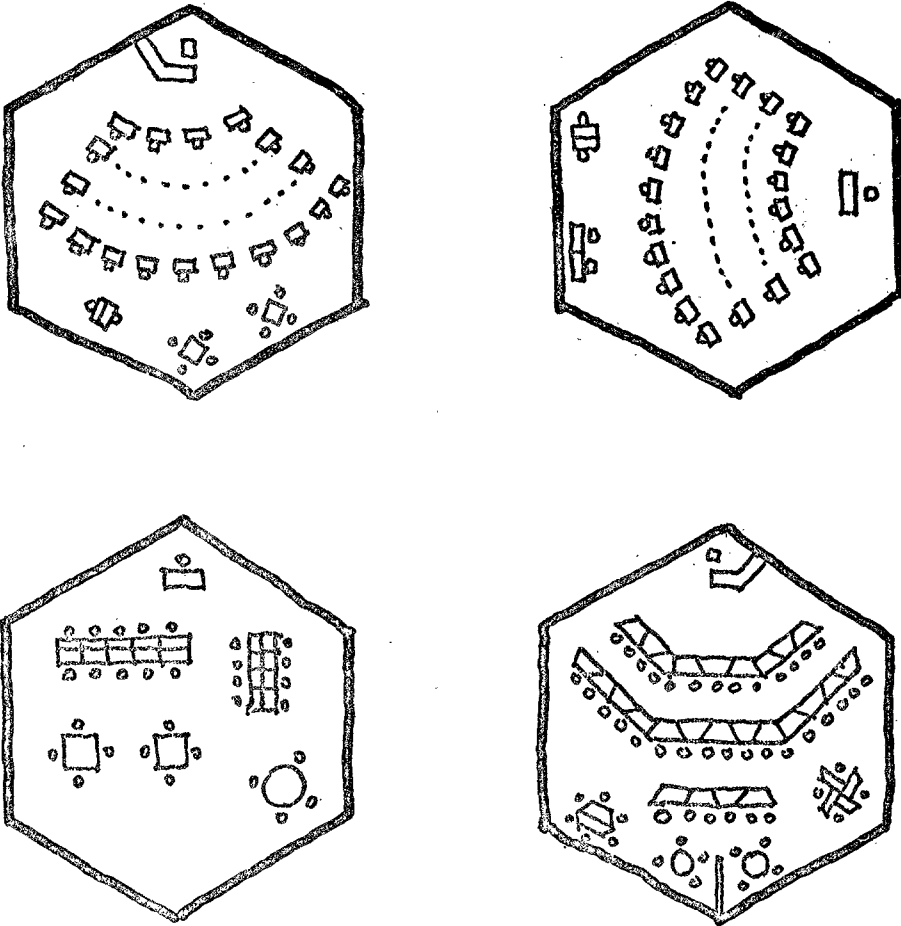
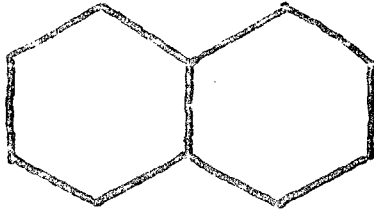


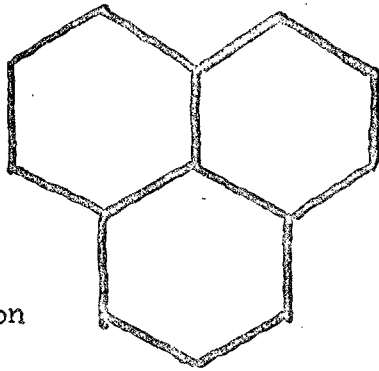
Fig. 4.17 Arrangements of Group Teaching in One Unit of Hexagonal Classroom

Hexagonal classroom unit can be combined to a cluster. The combination will provide more flexible use of space. Fig. 4.18 shows the possible combination of the unit.

(i) Two Units Combination



(ii) Three Units Combination



(iii) Four Units Combination

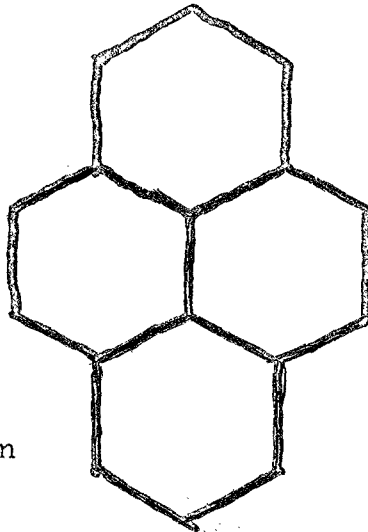


Fig. 4.18 Schems of Combination of Hexagonal Classroom Unit

There is a real and good example for five-units combination, housing non-graded "families" teaching in an open space (Fig. 4.19) ((19) p.22).

It consists of four hexagonal teaching stations arranged around a cluster's central commons (also hexagonal) with its own entrance, sink, and other fixed equipment, plus tracks in the ceiling beams to receive partitions.

The only adjunct space in the clusters is the team planning center, which is divided by a folding wall into two separate spaces: a curriculum lab where instructional materials and equipments are stored, and a teachers' office and work room. ((9) p.22)

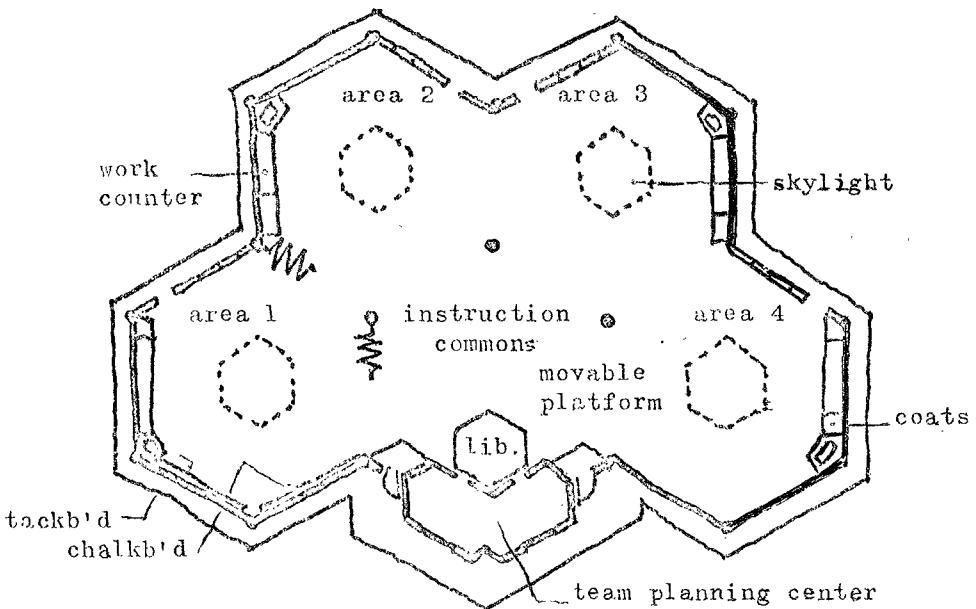


Fig. 4.19 Arrangement of Five Units of Hexagonal Space

Hexagonal shape can be divided into several triangular or trapezoid shape classrooms. A good example can be seen

in the following sketch (Fig. 4.20).

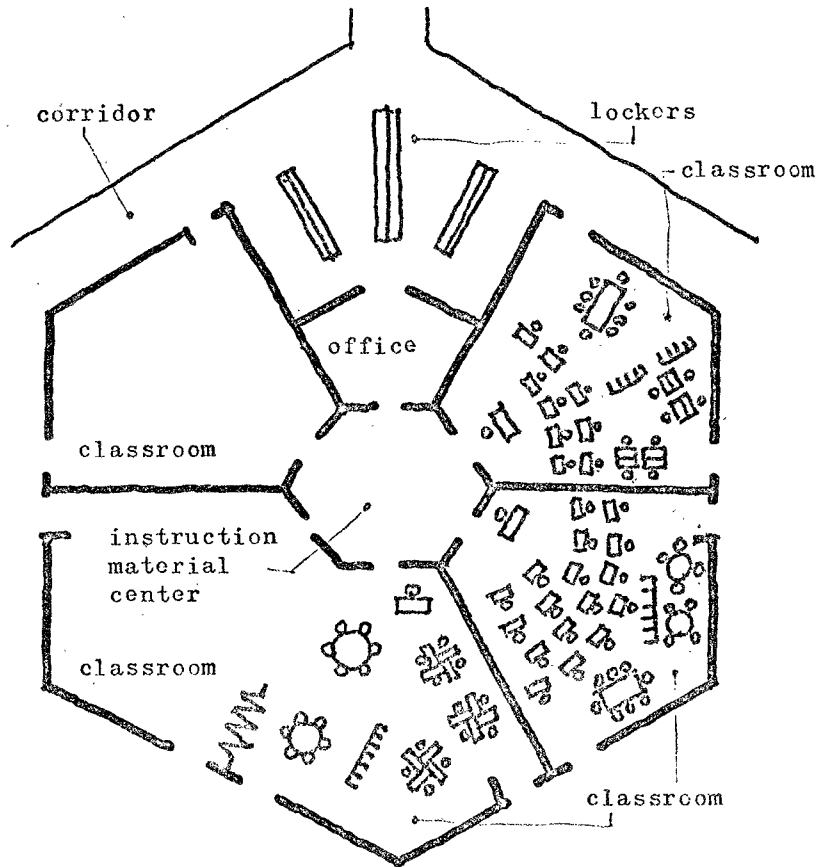


Fig. 4.20 Scheme of A Hexagonal Cluster divided to Triangular or Trapezoid Classrooms

This scheme provides the most economical shape for modular classrooms, and afford the informality, flexibility, efficiency, and variety that could not be obtained by using rectangular or even circular units. Financial economies not only result from special saving, but also from unified construction procedures. The hexagonal structure saves money by affording a series of repetitive forms capable of being cast over and over again in concrete. Classrooms were provided with operable partitions, offering opportunities to combine two

spaces at a time into one room. The new structure nourishes a lively program of team teaching and group teaching.

From the arrangement of furniture in the classroom we can see that hexagonal shaped space does not give economy in space only, but also gives high flexibility in furniture arrangement. Flexible arrangement of furniture in a room means the flexible use of space. To arrange the tables and desks in a room in straight lines facing front seldom proves satisfactory and often inhibits its use. ((11) p.18)

#### 4.3 MULTIPLE CLASSROOM

Multiple classroom is a classroom facilitated with teaching aid, instruments, equipment, etc. for special teaching as well as general teaching.

As indicated before, the small school affords opportunity for more flexibility than is usually possible in a large school.

Flexible scheduling grows out of MULTIPLE-CLASS teaching. Multiple-class teaching and flexible scheduling helps some small schools to offer a comprehensive program and at the same time, individualize instruction to a large degree.

School can schedule different courses under the same teacher in the same room at the same time. Such combination actually increases flexibility of scheduling because students may have more than one opportunity during the day to take a particular course. Students in all grades might be able to take

art during any period of the day. The same is true of industrial arts, mechanical drawing, and business education. ((14) p.12)

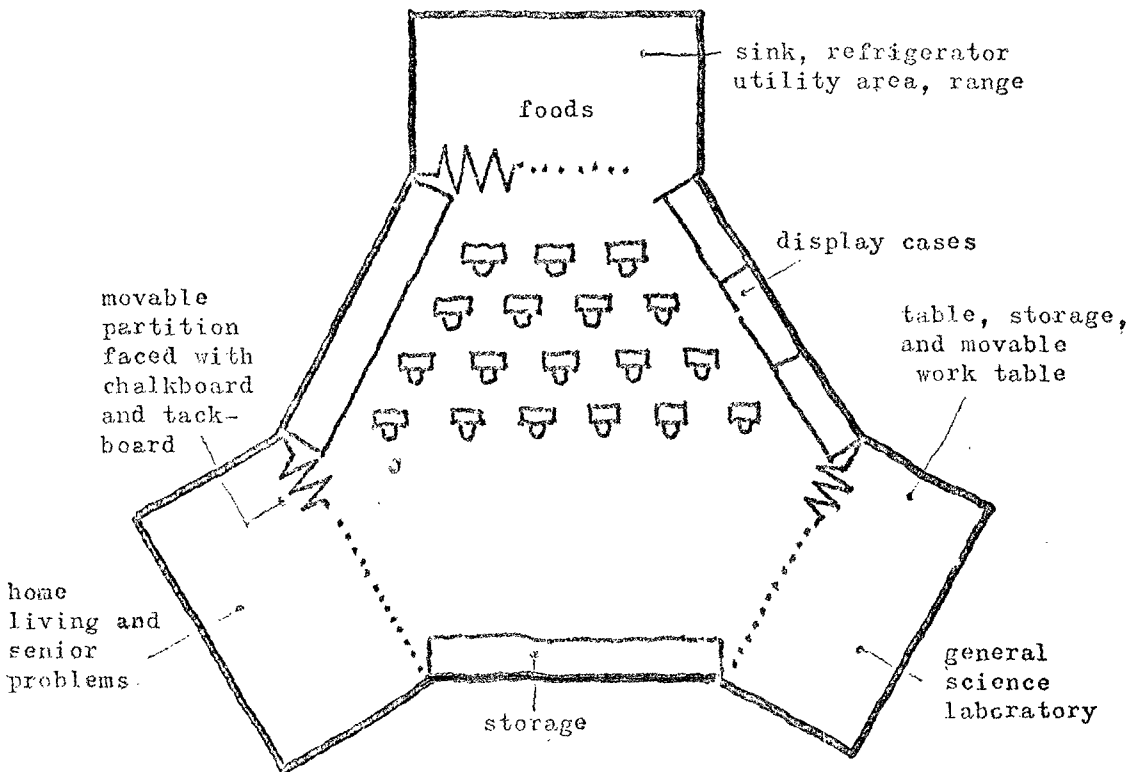


Fig. 4.21 Scheme of Convertible, Multi-teaching Classroom

Good example for greater flexibility and multiple use of space can be seen in the above sketch (Fig. 4.21).((14) p.81) It is planned that a basic hexagonal classroom has three alcoves equipped to provide instruction in different subjects. This concept could be utilized in classrooms for multiple-class teaching using all three alcoves at the same time. For most schools, where one or two rooms are used for more than one function, the multi-purpose classroom is ideal.

5.

FLEXIBLE SPACES IN SPECIAL  
SUBJECTS

Special subjects here are referred to particular areas of studies in arts and science such as languages, physics, chemistry, biology, etc. These are mostly taught in high school in special classrooms. However, some of them have been taught in ordinary classroom with little or no special facilities at secondary school.

For special science subjects, large school can be planned to include a laboratory for physics, one for chemistry, and one for biology, while the smaller school is limited to one laboratory that must serve all of these functions. The same kind of problem is presented by all subject areas; that is, teaching stations cannot be as specialized in small schools as they are in larger ones.

Here propose some examples which show the possible flexible use of spaces for special subjects, combining more than one subject to one space and several subjects to one cluster which can provide more flexibility in use in the following:

5.1 SCIENCE / MATHEMATICS

## (1) Science

The subject of science is taught in the observation, identification, description, experimental investigation, and theoretical explanation of natural phenomena, such as physics, chemistry, biology, etc. Facilities to be provided for this subject area include laboratory, greenhouse and experimental instruments, etc.

The science program can be scheduled on a flexible combination of subjects. For instance, chemistry and biology can be taught at the same time, and the teacher divides his general science class into two ability groups that he treats as different classes. While the chemistry students are working in the laboratory unit, the biology student can view a film or listen to a lecture. On the other hand, when students of a certain grade or certain group are doing laboratory work or working on problems while the other students are taking instruction of some sort.

Fig. 5.1 illustrate facilities that allow for the flexible use of space and teaching in science. In this instance, the arrangements for the science teaching resulted from an educational need. ((14) p.13)

The following sketch shows how a folding wall is installed between two rooms. This permits the science lecture room and the science laboratory to function either as separate facilities or, when opened, to serve as a single L-shaped class-



room. The shape of the room would allow one person to teach either a class of a regular number of students, or two small classes at the same time. On the other hand, the folding wall can be extended and two instructors can conduct two small classes simultaneously. If a screen is installed for film projection it should be either on a stand or on hinges so that the film can be seen from either section of the room. The laboratory for individual projects would provide facilities for advanced students in science to conduct experiments that require some time to perform, and the instructor could also use the area to demonstrate more complicated experiments.

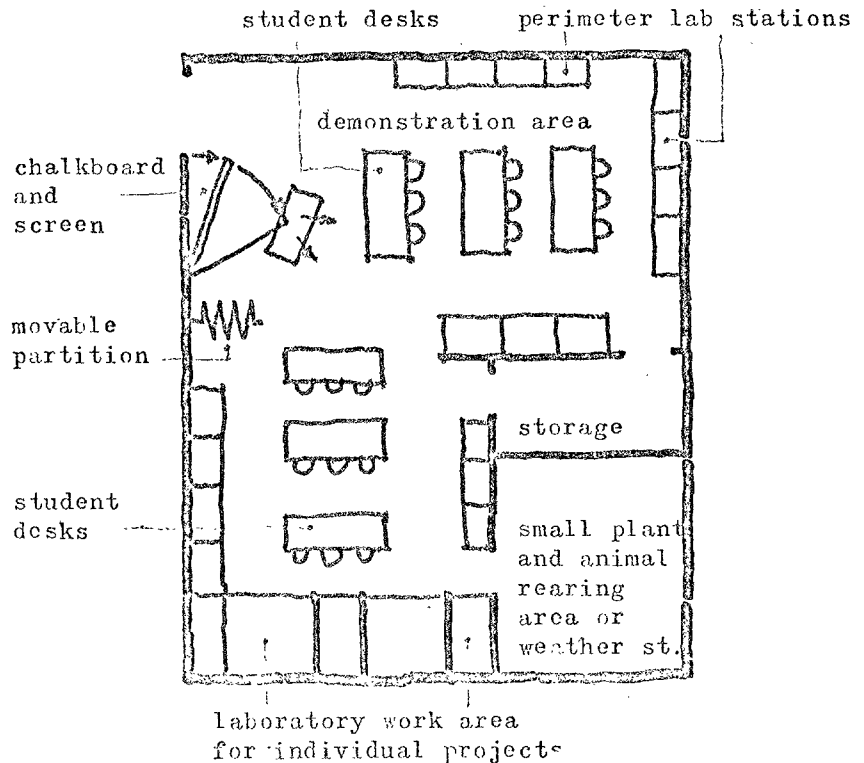


Fig. 5.1 Science Facilities for Multiple-class teaching

Sketched below (Fig. 5.2) is a science classroom as another example. ((8) p.10)

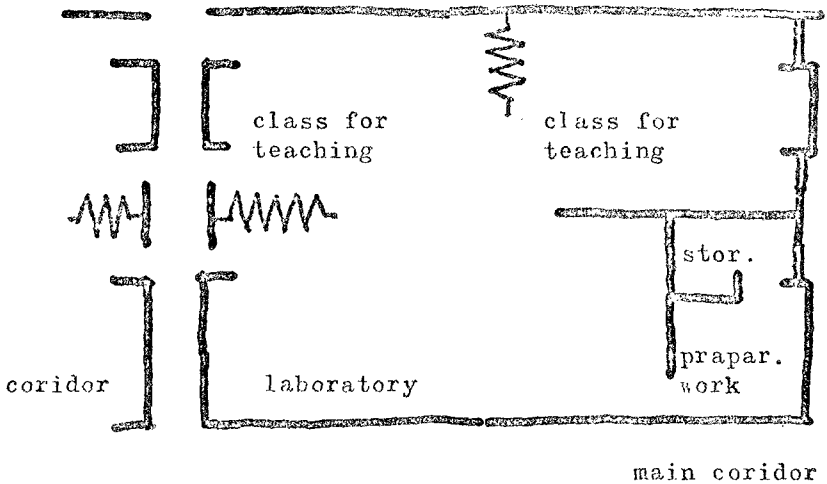


Fig. 5.2 Flexible Arrangement for the Teaching Area of Science

Students in these classrooms can move directly between teaching areas and laboratory without any loss of time or continuity. The laboratory space is immediately adjacent to the teaching space in the same cluster. This arrangement was designed primarily for the sake of compactness, but it has resulted in a high degree of coordination between theoretical and practical study.

This arrangement can accommodate two groups of student working at the same time: while one group attends lecture, the other can experiment in the laboratory. After a certain time they may interchange with each other.

Mathematics is the study of number, form, arrangement, and associated relationships, using rigorously defined literal, numerical, and operational symbols.

Since mathematics is a subject that does not require a lot of special equipment or facilities, it can be effectively taught in general-purpose classrooms. Its teaching probably can be improved, however, if it is taught in the science room which contains many equipment that could be used to improve instruction. The important consideration here is to provide enough flexibility in furniture to allow for the easy grouping of students for multiple-class teaching.

Occasionally, one teacher can handle three levels of mathematical ability simultaneously. In other words, one class can be divided into three groups taught at the same time. The group with the highest ability can work independently with minimum assistance from the teacher, who can then pay more attention to the other groups.

### (3) Science / Mathematics Cluster

To place science and mathematics adjacent to each other or to combine them into one cluster will give more flexibility in the teaching and use of space.

The plan Fig. 5.3 shown next page is a science and mathematics cluster with the intention of bringing physically related disciplines together. There are three laboratory spaces clustered around a storage and preparation room. The planning center is nearby so as to combine the effort of eight teachers

from the science and mathematics departments. Flanking the center are small seminar rooms which can be used for science of mathematics teaching while the three laboratories are occupied.

((4) p.58)

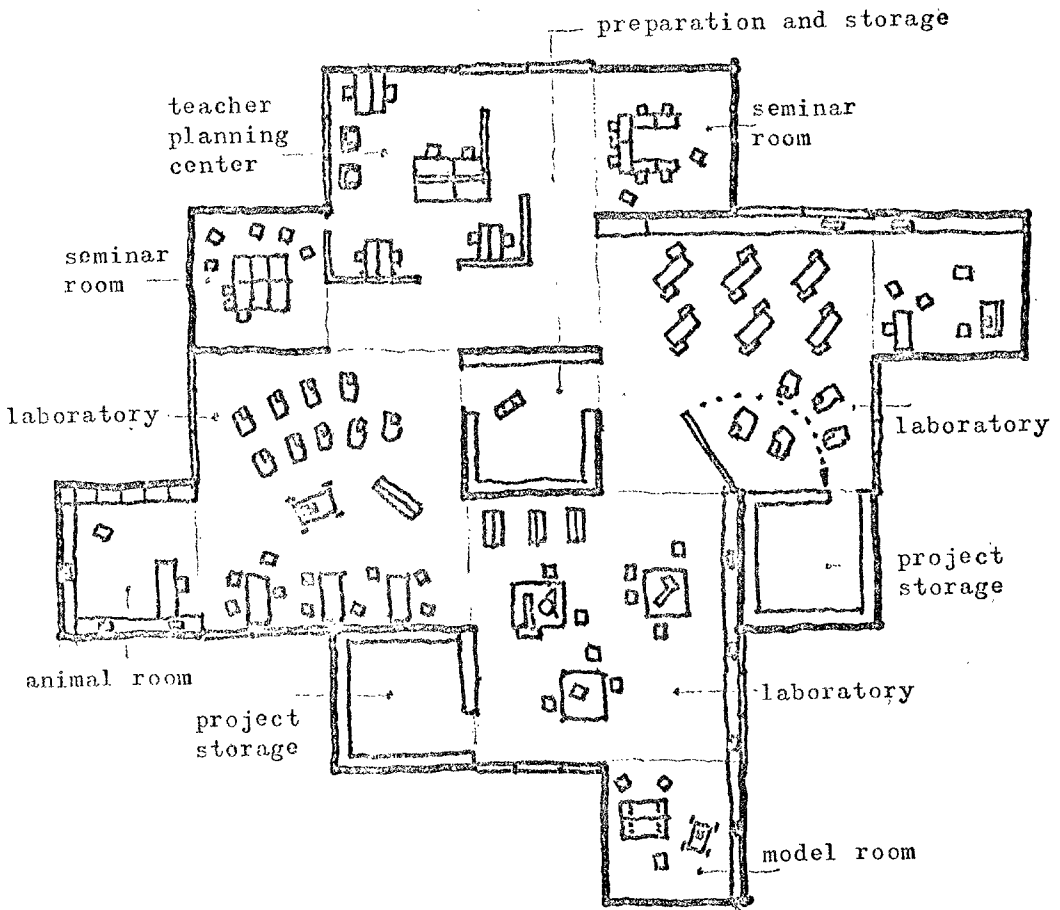


Fig. 5.3 Science / Mathematics Cluster

There are no arbitrary divisions between these subjects or spaces, so that a group of students can flow from one lab to another, easily providing mobility and flexibility of spaces. Except for the fixed plumbing counters all furniture and equipment are movable.

The small spaces abutting from the laboratories are

for students working on advanced, long-range projects. The one, on the left side, adjoining the laboratory contains cages for animals and all the requisite facilities. The space next to the laboratory on the right contains computation devices and other data processing equipment. The space off the combined central lab at the bottom of the drawing can be reserved for students working on geometric / chemical models.

## 5.2 ARTS / INDUSTRIAL ARTS / HOMEMAKING ARTS

The subject of arts is concerned with 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 this subject are drafting room, studio and darkroom etc.

### (1) Arts

This subject is particularly well suited to multiple-class instruction because during any class period the teacher can have students who are working at various levels and on different projects. For example the art teacher may have one class in which several students are working on ceramics, several are studying mechanical drawing, and one or more are working on oil painting. In addition to this kind of arrangement, some art teachers allow advanced students to enroll for art at any period of the day when the teacher is in the room. Thus, the teacher may have a class of certain higher grade students during a period and one or two seniors who are working on individual projects. The advanced

students receive personal instruction from the teacher when they need it; but most of the time they work independently. ((14) p.22)

The extent of the activities in the art program will be determined by the interests and skills of the art teacher and will, in turn, depend upon the kind of physical facilities provided. The activities typically include drawing (pencil, charcoal, crayon), painting (water and oil), sculpturing with clay, making paper mosaics, linoleum block printing, weaving, plastic cast work, wood burning, crafts (leather and art metals), and the study of art history in some programs. Some time classes may take field trips to art museums, or make extensive use of film strips showing the work of great artists to illustrate the use of various techniques.

The planning of adequate physical facilities for an art room is dictated by the nature of the activities to be provided, the scheduling of art classes, and the methods of teaching. The variety of possible activities is linked to the relatively high turnover in teaching personnel, with their different trainings and inclinations, stresses on the different aspects of art. But the art room must be planned in such a way that all of these activities can take place even though a given art teacher may not teaching some of the areas.

The spaces for teaching and scheduling practices must be flexibly provided so that a variety of activities can be carried out in the room at the same time. Movable furniture and equipment are desirable whenever possible. Also, a pull-curtain is important in a class for separation of space so that

filmstrips or 16mm. films can be shown to a small group while the other students continue their regular activities. These curtains would not necessarily have to be sound proof, as sound is not a distracting influence after the students have become accustomed to it.

The following sketch can provide the function indicated above:

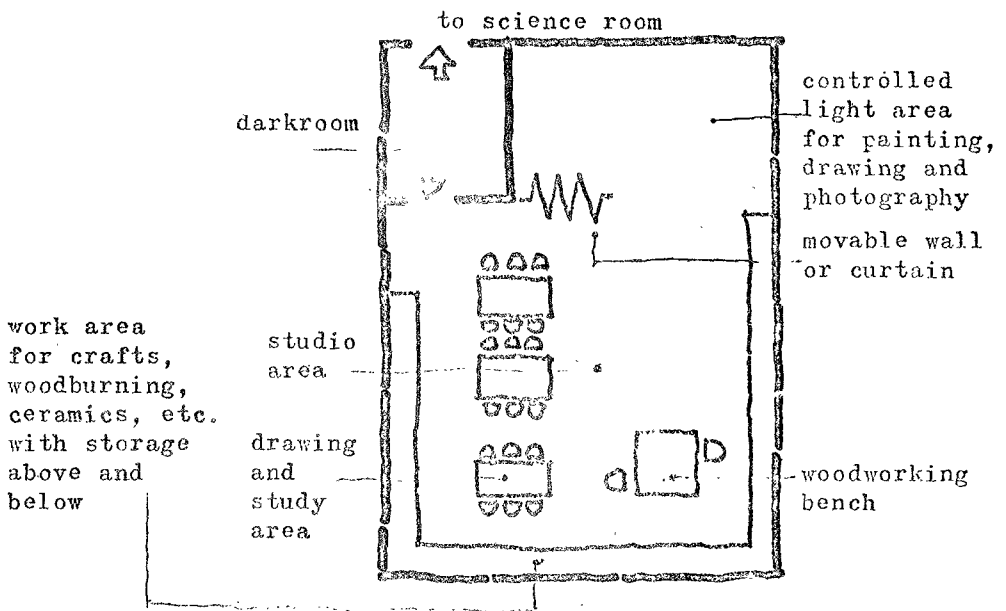


Fig. 5.4 An Arrangement of Art Room for Multiple-Class Teaching

(2) Industrial Arts

Industrial arts is the subject concerning with the art of industrialized work on wood, metal, electronics, etc. Facilities provided for this subject are tools, machine workshop and, if possible, an open yard.

In the traditional concept of scheduling, the various types of activities must be taught as separate classes. In the

modern school, a more fruitful and probably sounder approach from an educational standpoint, should consist of scheduling an individualized general shop program throughout the school day.

Students who may study about industrial processes begin each semester with two or three weeks in the classroom, concentrating on those processes which they will later explore in the shop-laboratory. In the work shop, students engage in a variety of activities on a rotating basis, so that on any given day some will be working with woods, others with metals, and still others with electrical apparatus. During the course of a year, all students will receive beginning instruction in all of these areas.

With such a general background, advanced high school students can readily undertake individual projects, working alongside the beginning students with a minimum of teacher supervision. In this case, senior high school students can use industrial arts facilities, working primarily on their own, during the time when junior high school classes are scheduled. In fact, students can acquire basic skills in the crafts without any formal group instruction and a minimum of teacher supervision. There, students use the equipment and facilities in the crafts room during their free periods or during any other time when they are not studying; and the older, more mature students, with two or three years of previous experience can instruct the younger students in basic techniques.

Once a school is organized by the concepts indicated above, so that a variety of activities can take place simultaneously in a general shop setting, with students of various levels



of maturity and accomplishment participating at the same time, the school has paved the way for a laboratory approach to industrial education.

Such a program would suit school of any size for both reasons of economics and human behaviour doubtlessly. It requires a general, rather than a specialized shop area for each phase of industrial arts, containing ample room in which students can move around and work on individual projects. The equipment and tools can be shared by classes in industrial arts and vocational agriculture. Where climatic conditions permit, much or the project work can also be done in the outdoor paved areas. Power tools can be mounted on wheels so that they can be moved from one part of the facility to another as needed.

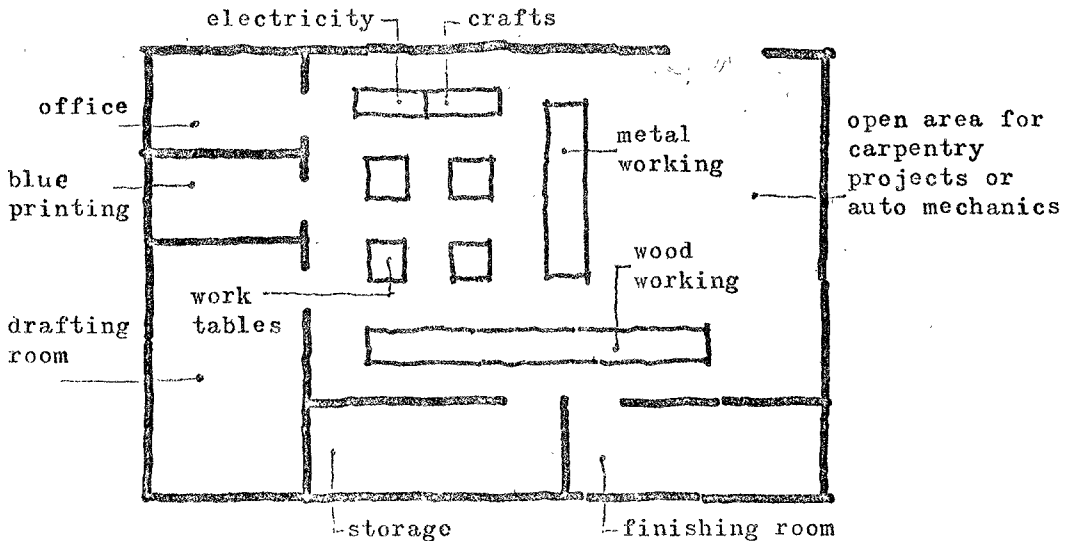


Fig. 5.5 General Plan for Industrial Arts Facility

The sketch on Fig. 5.5 illustrates a general plan for the facility required for the industrial arts program pre-

viously described. This plan provides space for variety of individual project work, accommodates flexible scheduling of student groups and equipment, and ensures an adequate amount of necessary teacher supervision. ((14) p.32)

### (3) Homemaking Arts

Homemaking arts is the subject concerning with the art of home management, including household budgeting, clothing, child care, cooking etc. It is also known as home economics.

In a small school, and sometimes in a big one, it is necessary to have flexibility in two conditions that offer a complete program in homemaking. First, there should be facilitated for a multi-purpose room which will include a fitting area, a kitchen area or several kitchen units, work tables and sewing machines and a living area, preferably located at one end with no walls separating it from the rest of the room. Second, the teachers must make an experimental approach by using the homemaking room as a homemaking laboratory. Advanced homemaking students can work quite independently on numerous experimental projects, and they may work on their projects during any spare time, even while other classes are in progress. The senior high students may be working on some units with a minimum of supervision while the junior high classes are studying other phases of the program.

The teacher, for the purpose of efficient instruction of groups, can teach more than one unit at the same time. several units, such as interior decoration and clothing, actually are taught at the same time; and the advanced students engage

in more individual study or experimentation with only occasional consultation with the teacher.

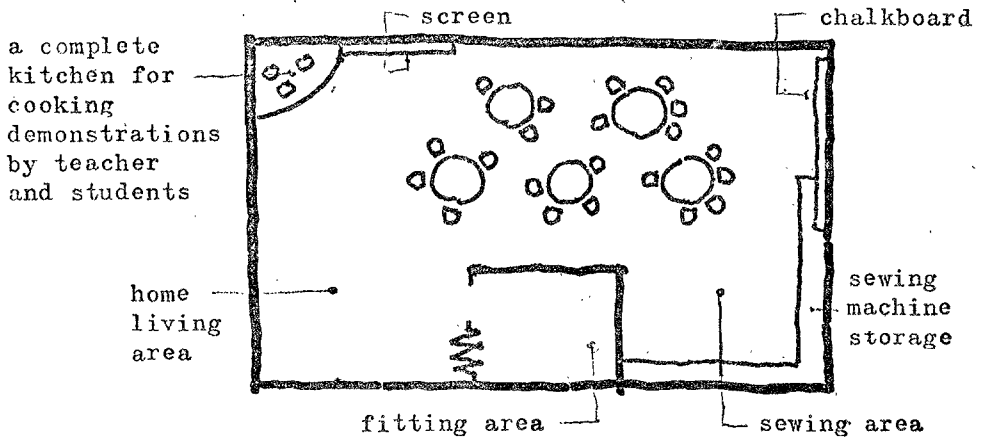


Fig. 5.6 Facilities for Homemaking Arts with only a Demonstration Area for Cooking

The above sketch (Fig. 5.6) illustrates the minimum facility required for a comprehensive homemaking program. The foods demonstration area consists of a single kitchen unit at which the instructor or various members of the class can demonstrate various techniques of food preparation. No provision is made, however, for the entire class to cook at the same time. As with the science laboratory, the homemaking laboratory should be characterized by a variety of individual experimental projects rather than the stereotyped "cookbook" approaches. The living area can, when isolated by the use of folding screens, serve as a fitting-room for clothing projects. The third area in the homemaking room contains work tables and sewing machines.

((14) p. 34)

If a school desires to provide enough equipment so

that several students may work on food projects at the same time, the sketch (Fig. 5.7) below illustrates an efficient kitchen area designed to accommodate as many as eight students at one time. Actually, this unit consists of four kitchens, each for two-students. It is an adaptation of the concepts employed in trailer home kitchens. In the center is the storage unit for staples for all kitchens. Each kitchen could be equipped with different types of equipment,-- stoves, refrigerators, sinks, dishwashers -- so that students, by rotating from one unit to

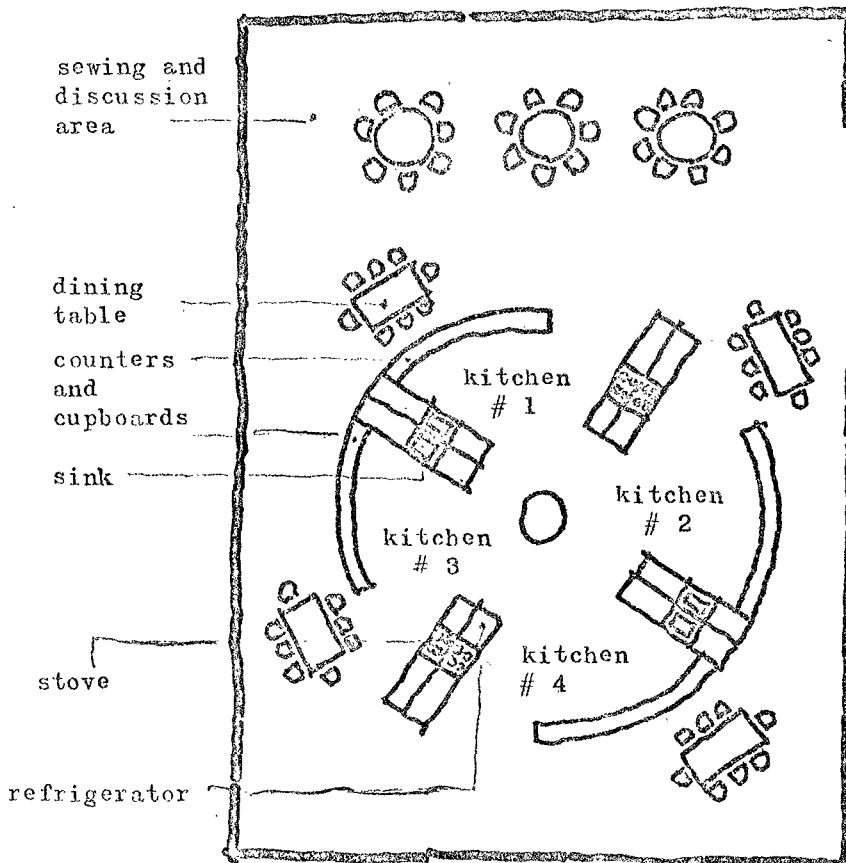


Fig. 5.7 Illustration of a Two-Student Teaching Unit for Cooking

another, can become accustomed to the various appliances. ((14) p.35)

Both the outer counter and the dining table are used for eating - surfaces and meal-serving, and the counter is an ideal space for teacher or student demonstrations.

The total homemaking room could accommodate larger groups on a multiple-class basis so that some students would use the kitchens while others work on other projects or activities.

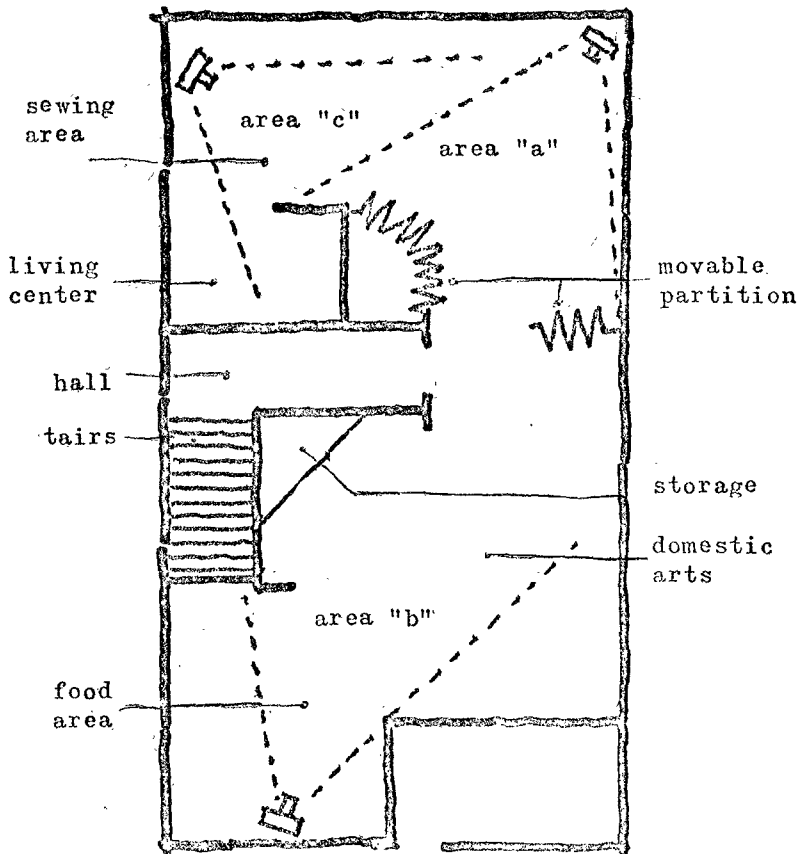
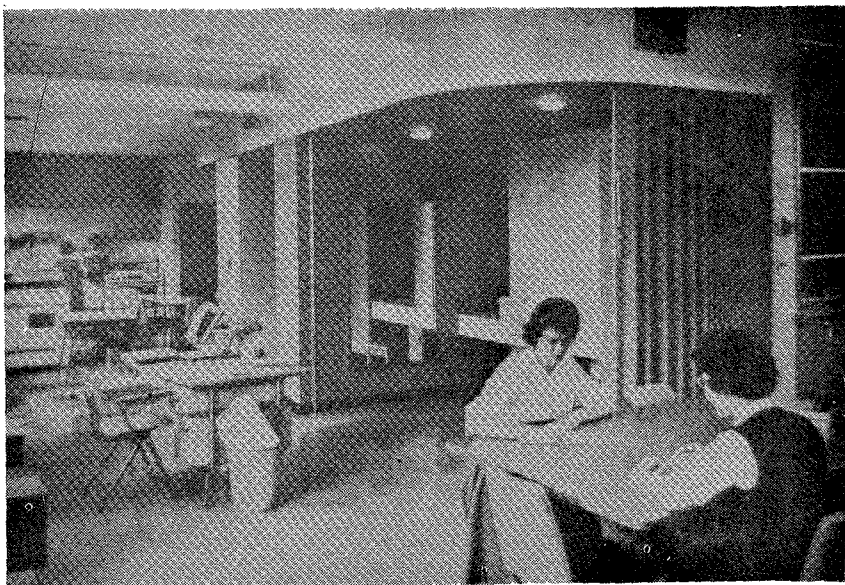


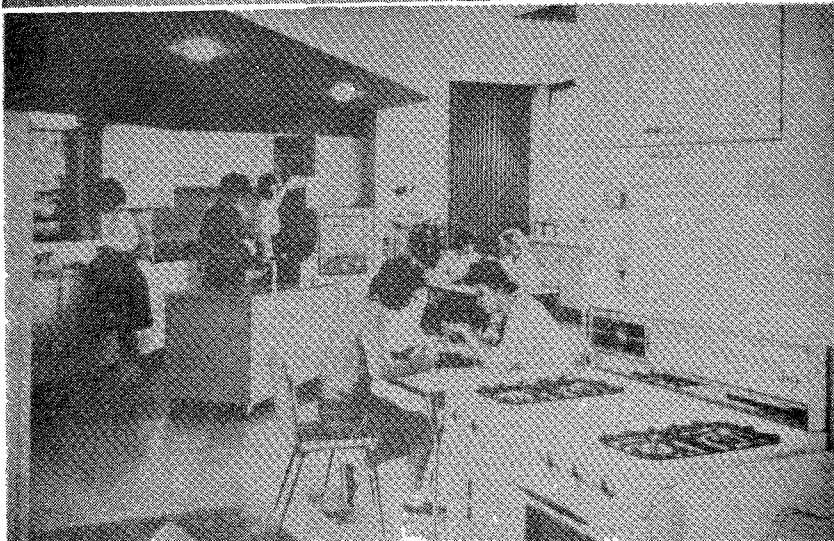
Fig. 5.8 Arrangement of The Homemaking Room

The sketch shown above (Fig. 5.8) may represent the

(i) Area "a"



(ii) Area "b"



(iii) Area "c"



Fig. 5.9 Photographs Showing Homemaking Room of Plan Fig. 5.8

ultimate in homemaking rooms. It provides either one or two teaching stations. The area is separated into two rooms by a folding partition. The accompanied photographs show the area indicated in the sketch. As these pictures and sketch indicated, such a facility can accommodate a comprehensive homemaking program which utilizes multiple classes, flexible scheduling, and an experimental approach to learning. ((14) p.36)

Photographs show in three area:

Area "a" shows the folding wall closes off the fitting room when necessary and folding wall just beyond the teacher's desk divides the homemaking area into two teaching area.

Area "b" shows the kitchen unit at the right of the photograph is for demonstrations.

Area "c" shows the desk area at the right is the living center and the rest of this area is for sewing.

#### (4) Arts and Industrial Arts Team Teaching

Team teaching is a means by which the efforts of two or more teachers of different subject areas can be combined to teach in one class or to supplement each other in different classes. For example the teachers may supplement each another in the areas of arts and industrial arts. There are many occasions when the arts students can use the industrial arts shop and receive instruction from the industrial arts teacher. Similarly, there are occasions when the industrial arts students need the assistance of the fine arts teacher.

Teachers of both arts and industrial arts can use the space in the crafts area jointly, e.g. one small room can be

used for both the mechanical and fine arts drawing. Furthermore, the shop and art room should be planned to facilitate team teaching. In this way, teachers of science and industrial arts should be able to work together in the same area. Also, English and business education can be profited by team teaching.

The rooms for industrial arts and arts can be arranged in a way to encourage the joint use of facilities and team teaching. The sketch (Fig 5.10) shown below illustrates this concept. ((14) p.33) The crafts would be located in the art room, whereas mechanical and fine arts drawing would be in a room accessible from both the arts room and the industrial arts area. This room would also provide audio-visual aids for both areas.

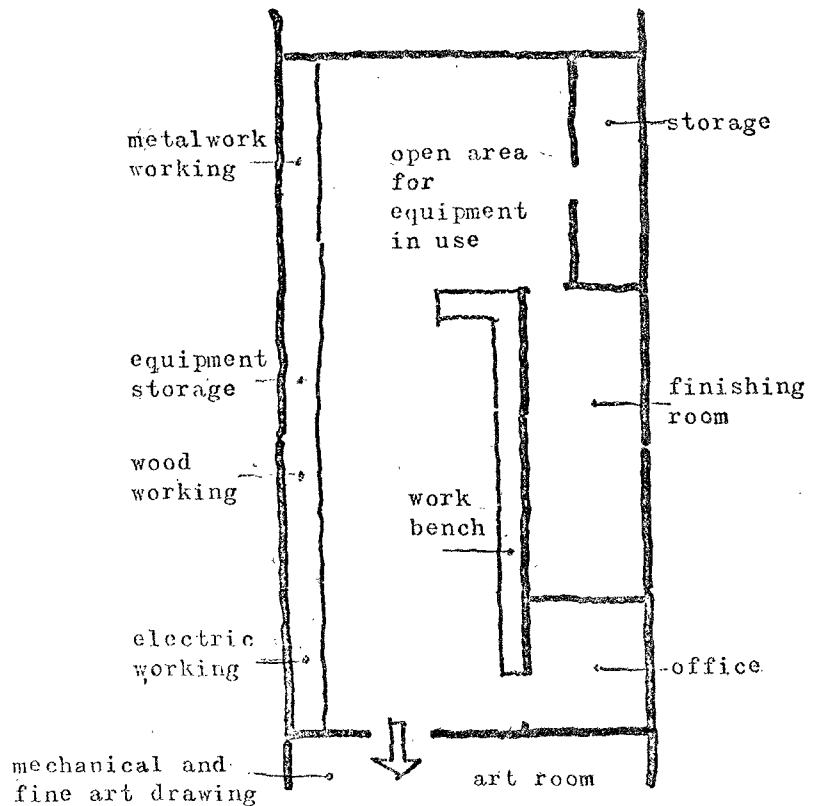


Fig. 5.10 Shared Facilities for Industrial Arts and Art



Mechanical drawing can be scheduled for any period that the industrial arts teacher is in the shop. During a given period, this teacher might have two or three students taking mechanical drawing and several others working in the shop on activities such as building picture frames, stretching canvas and so forth. The general shop would be equipped with movable equipment which would be stored along the perimeter of the room. In this way, unnecessary and costly duplication of equipment and space can be avoided.

#### (5) Arts Cluster

To place arts, industry arts and homemaking arts adjacent to each other, or to combine these subjects into one cluster surely will provide more flexible use of spaces, facilities and teaching schedule.

The sketch (Fig. 5.11) shown below is the arts cluster that provides for creative arts, industrial arts, and the domestic arts. The concept of the planning is to place the units of creative and practical arts in one cluster. Each area flows into another with a minimum of dividing walls. This planning seeks to eradicate the old opposition between artsy-craftsy girl work and rugged manual boy work by placing them into one cluster, but is still sufficiently flexible in that the area containing the noisy power tools can be enclosed and isolated by sliding partitions whenever required. ((4) p.56)

A similar concept has been made by another design as shown by the the sketch Fig. 5.12. ((8) p.29)

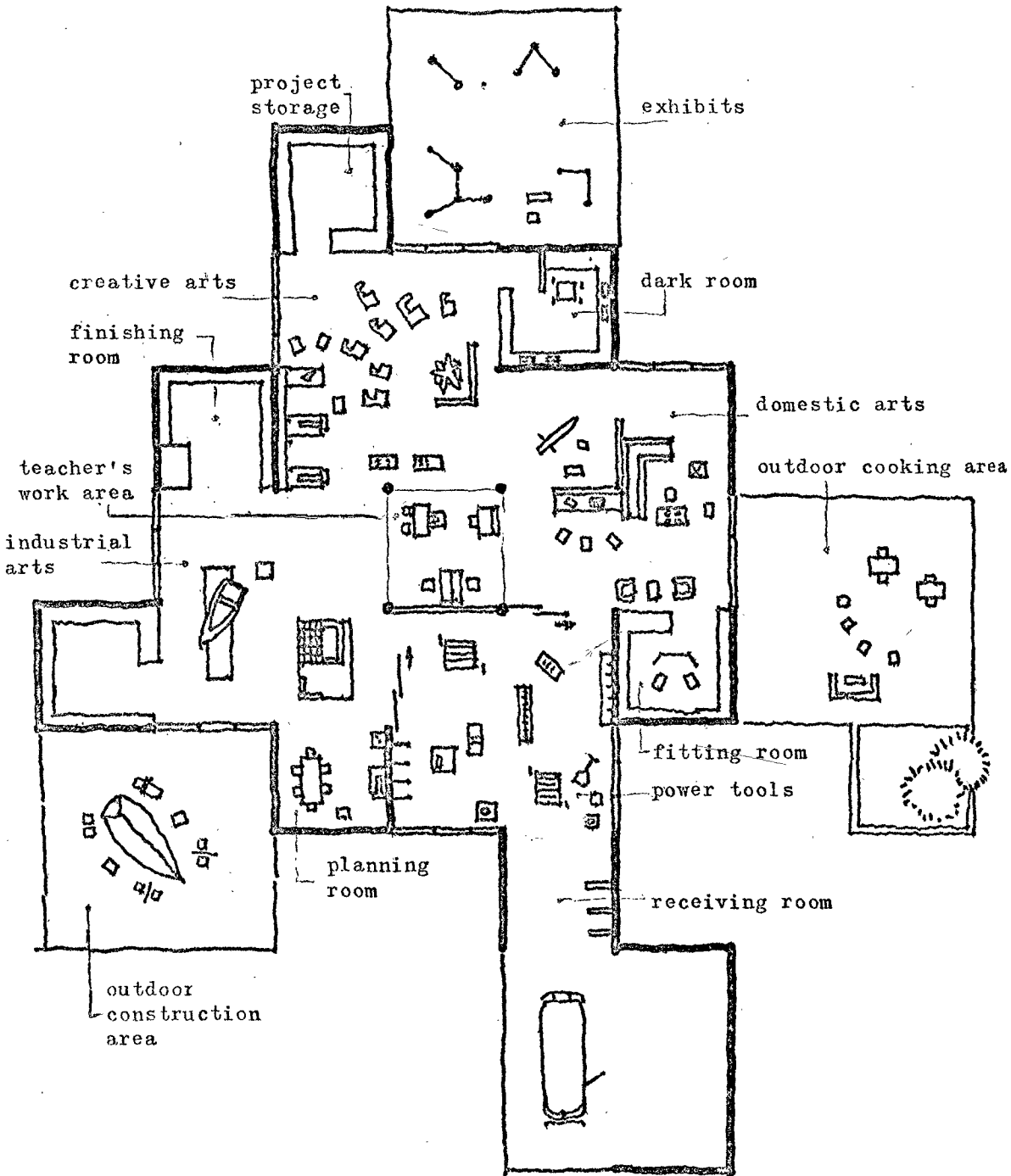


Fig. 5.11 Arrangement of Arts Cluster

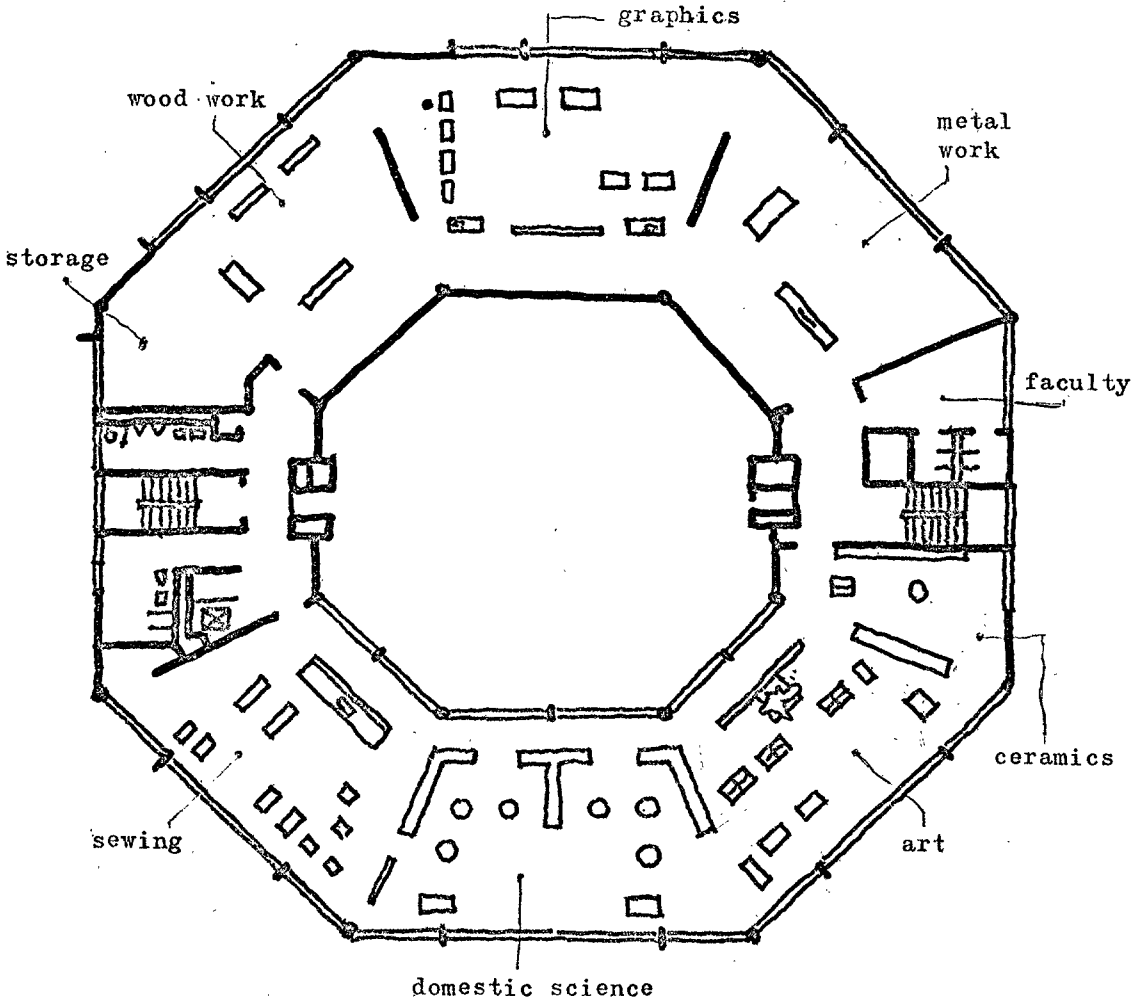


Fig. 5.12 Arrangement of Arts Cluster

(6) Science and Arts Connection

The extent to which flexible spaces in a certain area can be shared by two or more subjects will determine the spatial relationship of the teaching stations. For example, science and arts can be placed together so that the darkroom can be used by students in both fields. Students in arts and industrial arts can actually use the same area for drawing.

It will be wiser to place science next to the indus.

trial arts room so that the facilities in the latter would be also available to science students to build some of their own scientific apparatus.

storage and individual work

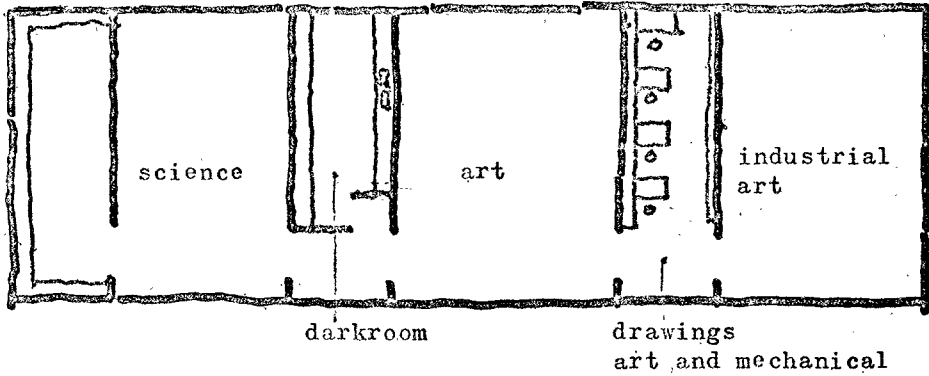


Fig. 5.13 A Connected Arrangement of Science and Arts

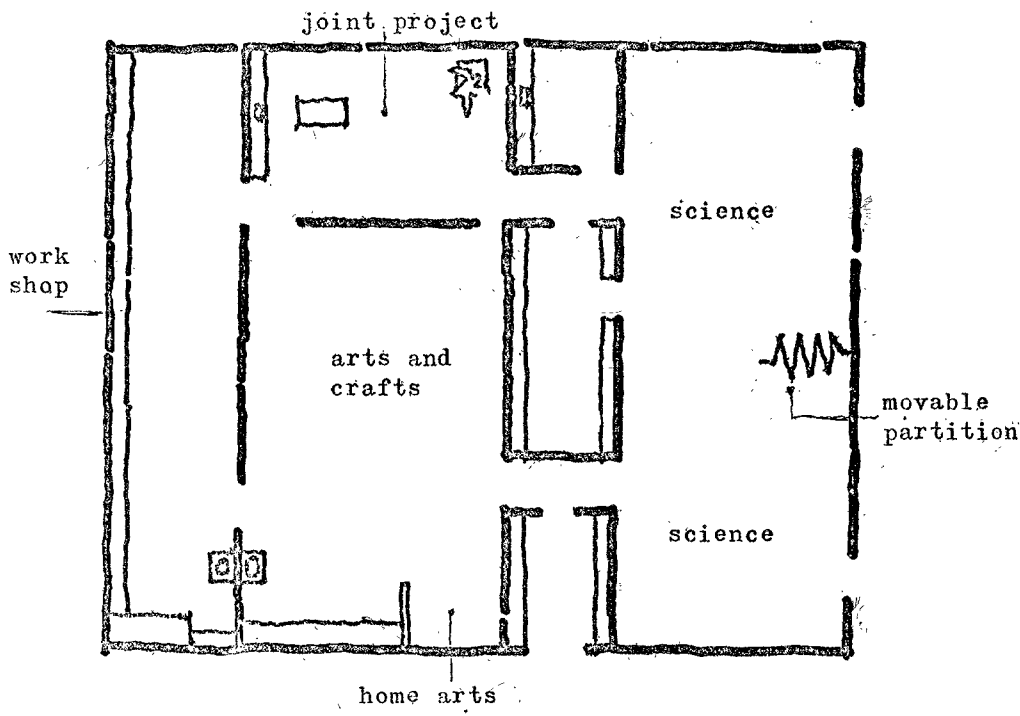


Fig. 5.14 Flexible Arrangement of Arts and Science with Darkroom between

Another flexible arrangement combining science, arts and crafts with darkroom, is shown above. (Fig. 5.14) ((8) p.21)

### 5.3 MUSIC

Music is a subject concerning with the art of organizing sound, so as to elicit an aesthetic response from a listener. Facilities for the teaching of this subject should include individual and chamber practice rooms for both vocal and instrumental musics and performance hall.

Musical performance, such as bands and choruses, is stressed in most high school music programs. Some schools offer courses in general music or music appreciation as general education requirements while other schools also offer courses in music theory and counterpoint for those students who are interested. The common practice is to develop the ability of the students to perform, concentrating on those students with musical talent, and to devote most of the instruction time to rehearsals for public performances, because students will learn to appreciate and understand music through performances. In addition, frequent public musical performances will raise the cultural level of the community. Furthermore, students can profit from the opportunity to hear good music performed by professionals, as listening experience can extend the student's musical horizons. Professional performances can thus serve as models for the student performer. Students, therefore, should have the opportunity to hear great artists play or sing the music which

the students themselves are learning to perform.

To facilitate the above indicated purposes the following conditions must be fulfilled: First, the music rehearsal room must be equipped with a tape recorder, disc records, and television for both audio and visual presentations. Second, students must have the opportunities to listen to music privately. Facilities for the latter purpose can be provided by equipment used in conjunction with the language laboratory where students can listen in isolation, or they may be provided in the form of listening rooms where students can share the experience of listening to good music in a relaxed atmosphere.

For most small schools, one music performance room will suffice. If properly designed, the stage can serve this function. The performance area should provide adequate storage area and sufficient space to accommodate student traffic.

The provision of individual practice rooms will depend upon the emphasis of the school's program on the individual instruction of vocal and instrumental music. They are always located near the regular music room and can be used throughout the day for students who have time to practice on their own. Such rooms are essential also for any program which offers private instruction for beginning students or for any program which includes small ensemble performing groups.

In the case where the stage is used as the main music rehearsal room, the adjoining practice rooms can also serve as dressing rooms for dramatic productions.

The following sketch (Fig. 5.15) was adopted from (4) p.56 and improved by the author. There is a dual operable parti-

tion between the instrumental and choral room. During rehearsal or informal performance, one of the rooms can be used as the audience area, the other one as the stage. When these rooms are used separately, the operable dual partition can be pulled to baffle the sound from the other room.

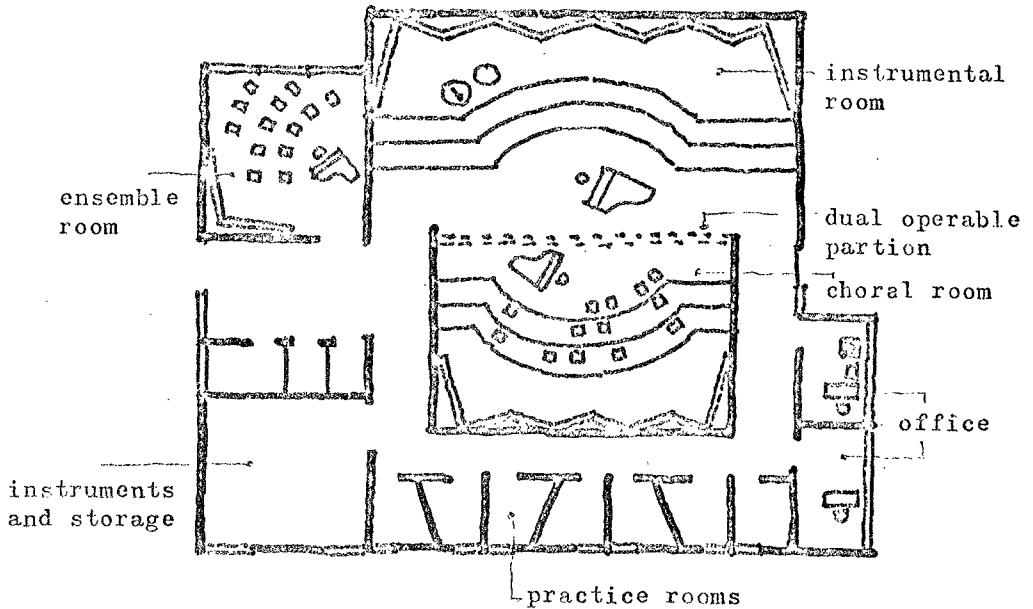


Fig. 5.15 Arrangement of Music Department

#### 5.4 COMMUNICATION

Communication is a subject concerning with the interchange of information by the use of language or any other means. Facilities provided for the teaching of this subject are audio instruments, carrel for individual study and / or a language laboratory, etc.

Four main streams of communication are considered here:

## (1) Foreign Language

Flexible, multiple classrooms can be used for students who require training in foreign languages. The teacher needs not deal with the class as a whole, but can work with the individuals and groups taking a certain language. Tapes and recordings, both commercially produced and self-prepared by the teacher, can be used. Several levels or several languages can be combined in one classroom at the same time. Some sort of physical arrangements in addition to the provision of language laboratory needed to facilitate the instruction. For instance, a curtain or folding wall in the center of a room would allow one group to watch a film without disturbing the others.

The following sketch (Fig. 5.16) shows the combination of classroom and language facilities. The teacher can also make

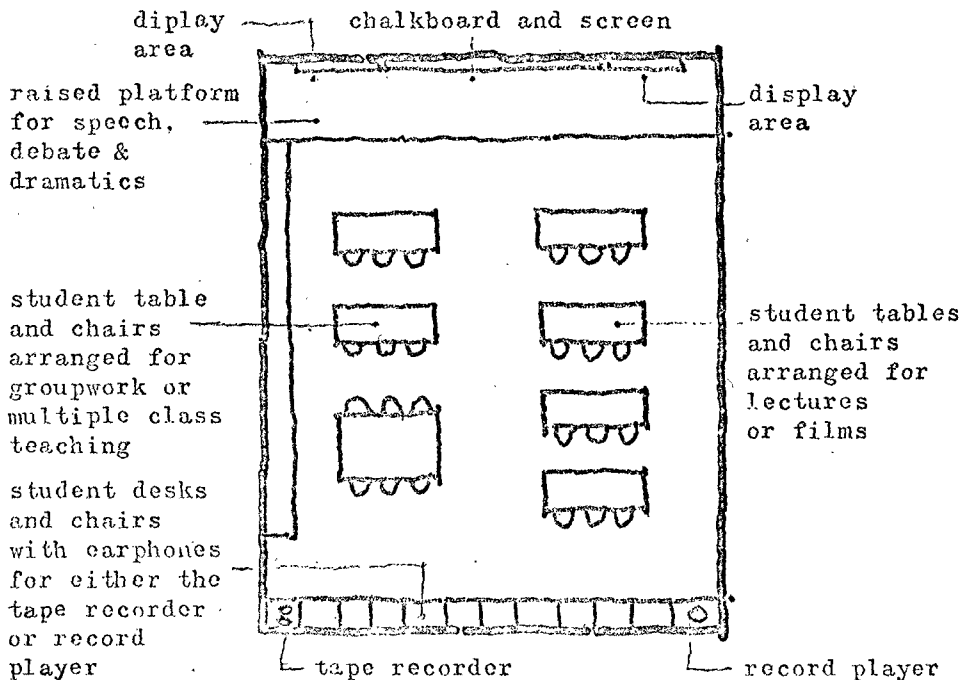


Fig. 5.16 A Classroom for Foreign Language and English



use of the equipment in the language laboratory to teach English. Earphones are located at tables or desks along the back of the room so that students can use them while another class is held in the room. It is desirable to separate the language laboratory from the rest of the classroom by means of curtains or partitions to provide some visual privacy for the various groups using the room at the same time. These curtains or movable partitions do not need to be sound-proof or to provide for complete isolation, but it should be possible to show a filmstrip or 16mm film in one part of the room without interfering with the other groups in the room. ((14) p.23)

In the sketch below (Fig. 5.17) is a small room that is planned primarily for language instruction but can also be

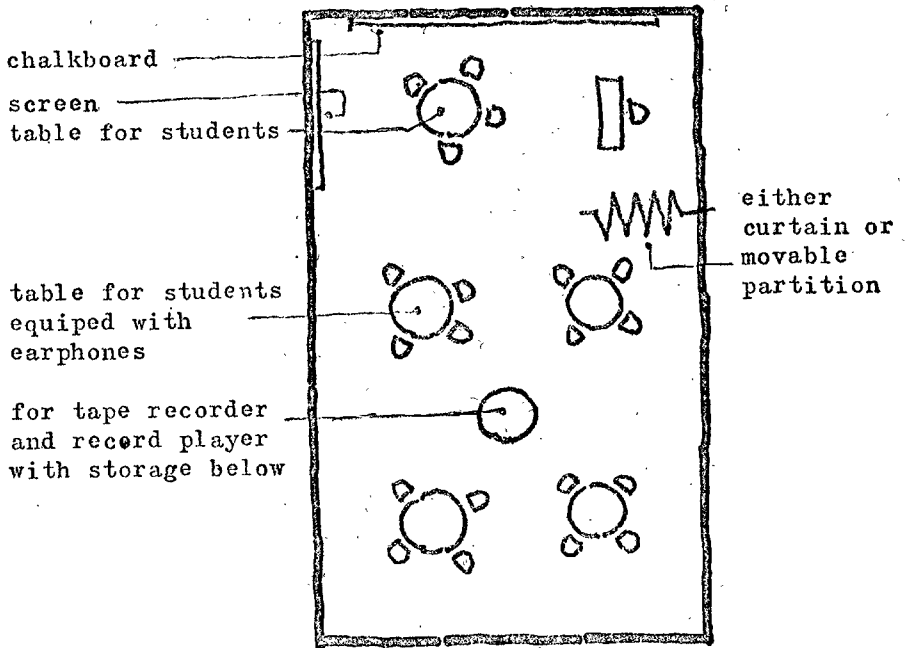


Fig. 5.17 A Language Laboratory for Multiple-class Teaching

used from time to time by the English teacher. This room has the same basic equipment and characteristics as the combination room (Fig. 5.16) but it provides for more freedom and flexibility in the use of the equipment. ((14) p.23)

## (2) English

The flexible approach in the teaching of English is designed to allow various members or groups in the class to engage in different aspects of English according to their needs and abilities. In any given class, some students may be working on basic skills, others on mechanics of expression; still other on spelling or on writing. In another class, one group might be working on remedial reading while the other works on speech or literature.

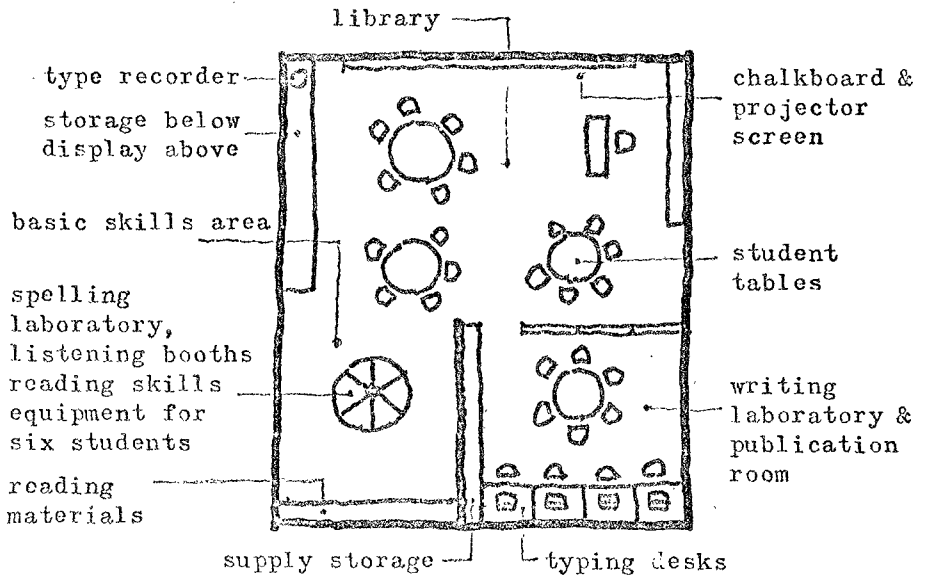


Fig. 5.18 English Classroom for Multiple-Class Teaching

The school that departs from the standard program will need to pay particular attention to a facility design. The sketch

shown above (Fig. 5.18) illustrates one type of facility which will accommodate a combination of activities. Some students will be working to improve their spelling or reading ability at the study center in the basic skills area; others will be working in the writing laboratory, and a third group may be studying literature or speech in the area where tables are provided. This flexible approach can apply to either a graded or an ungraded English program.

The writing area can serve a multiple function as a writing laboratory for English, a publications room for the newspaper and yearbook and an instructional area for shorthand writing. ((14) p.40)

### (3) English Team Teaching

Team teaching can be considered in English. For example, two teachers would be assigned to two sections of English scheduled at the same time. On any other days of the week the two sections could be taught as one class by one of the teachers. On another day, each teacher would have a group of 25 or 30 students. On still another day, teacher "A" could have a class of 45 while teacher "B" would work with ten or twelve students on a remedial reading program, or so.

Facilities for English team teaching should be planned to provide listening stations around the room for the instruction of foreign language, table and chairs in the center, a tape recorder and record player, and storage for reading equipment, including projectors. The sketch below (Fig. 5.19) is the proposed arrangement in the laboratory/ room. ((14) p.47)

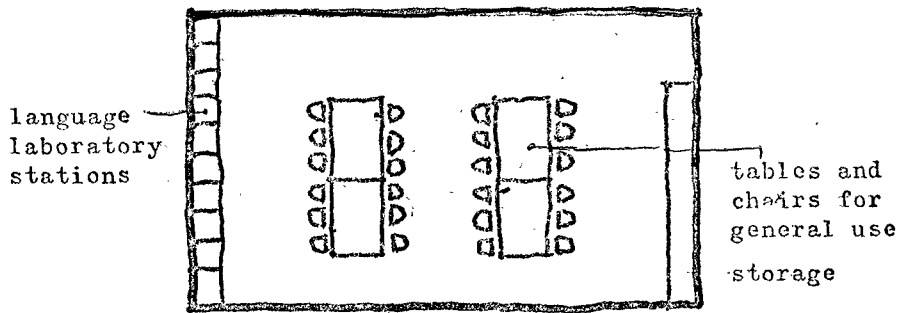


Fig. 5.19 The Laboratory for the General Instructional Area

(4) Communications Cluster

Combining related subjects into one cluster will give more flexible use of spaces, facilities and teaching schedules.

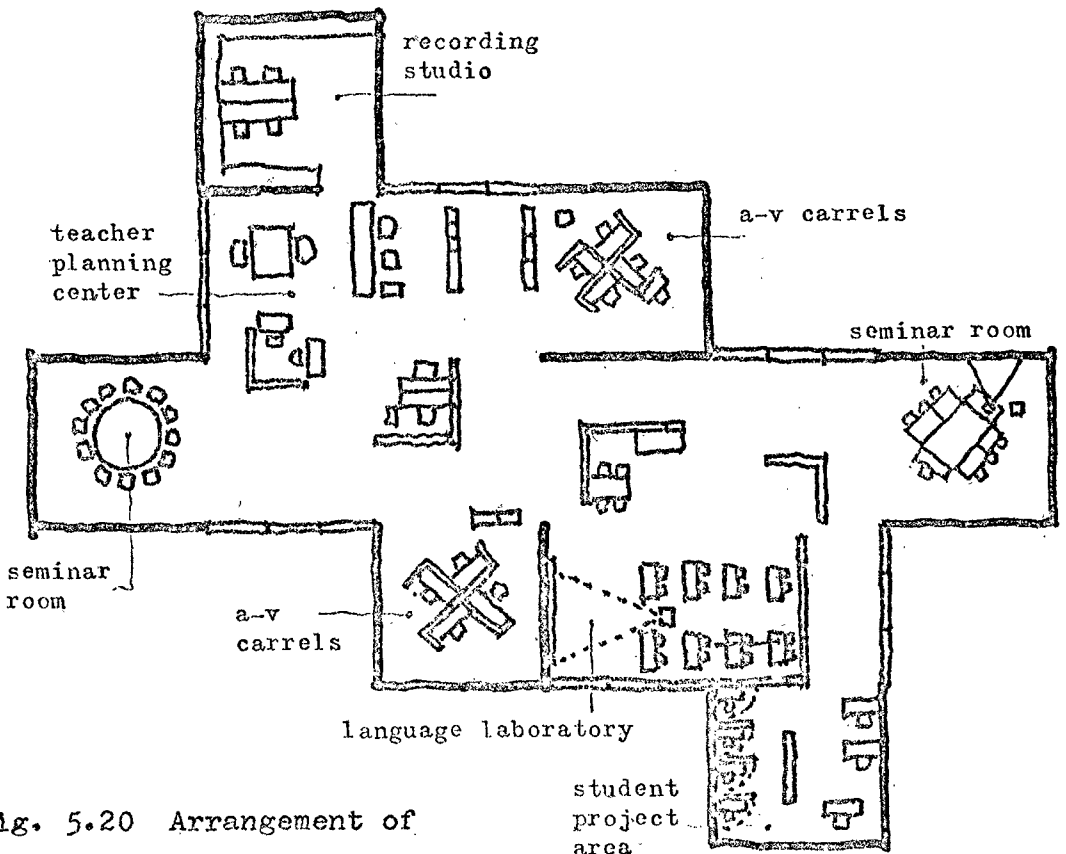


Fig. 5.20 Arrangement of Communication Cluster

The plan (Fig. 5.20) shows a communication cluster for English, foreign language, reading and speech. Central spaces are surrounded by small special-purpose rooms, -- for listening, conferring, testing, seminars and recording. There is no particular wall dividing the space so that made the space flows from one to another, depending on the number of students and the kinds of interdisciplinary projects on hand. ((14) p.56)

## 5.5 BUSINESS

Business is a subject that teaches formal business practice and a variety of business activities such as the use of office machines, bookkeeping, shorthand writing, filing, etc. Facilities for teaching this subject should include different office machines such as calculator, adding machine, ten-key machine, electric typewriter, dictaphone, duplicating equipment, etc.

### (1) Class Teaching

Class teaching is applied to business education in most schools. Some business teachers assign students to practice on office machines on a rotational basis, allowing students to instruct each other while furnishing demonstrations and assistance when needed. Such a procedure not only allows efficient use of teacher time but also the economical use of equipment and facilities. Sometimes, office practice can be combined with shorthand instruction in a room divided by a glass partition.

While shorthand students are taking dictation from recorded tape, the teacher can give directions to the office practice students. Then, when the latter group is carrying out its assigned work, the teacher can return to the shorthand class with additional instructions and new materials for students there.

The teaching schedule mentioned above will accommodate a variety of activities in a single room, where both group instruction and individual study can take place at the same time. Without the sacrifice of the general education values, such a facility can accomplish the vocational aims to design it to resemble an office. The sketch below shows a classroom that can accommodate a large class in typewriting or a multiple class for three subjects. (Fig. 5.21) In a typing class, students could be

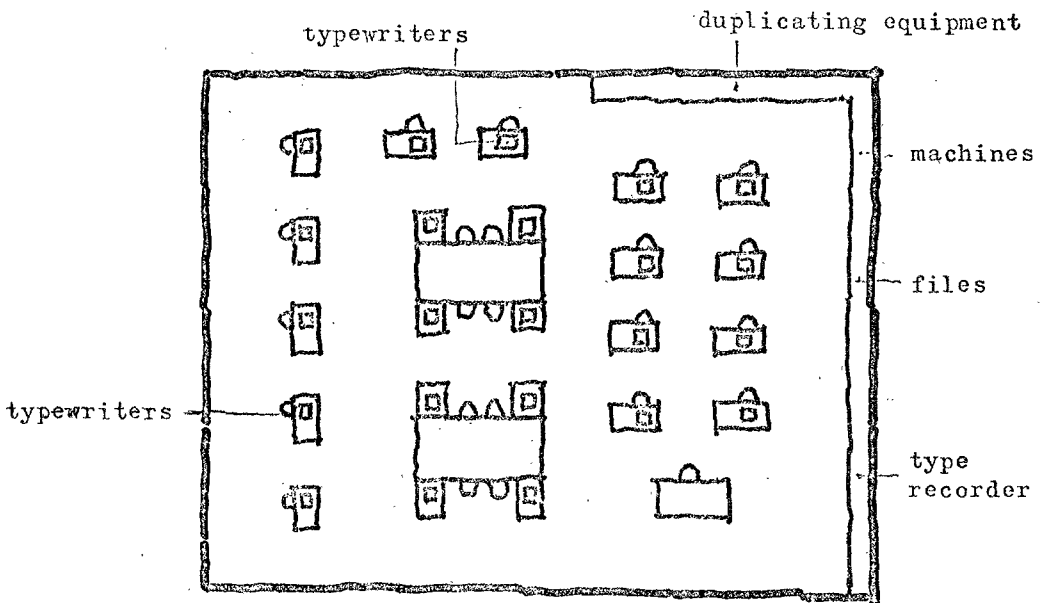


Fig. 5.21 A Business Education Classroom designed as an Office for all Business Subjects

grouped according to their stage of progress and seated at various areas of the room. In a multiple-class situation, an office practice class could be working near the files and the business machines while advanced typing and shirthead classes are working in the other end of the room. ((14) p.28)

Desirable flexibility in scheduling can be achieved if every period is open to any students in business education, instead of the usual practice of assigning each separate class to only one or two periods in the daily schedule. Thus, within any given period, the teacher might have four or five first-year and three or four second-year students. Each student would learn the same material that is normally covered in a sequence of business education courses, but on an individual basis. Perhaps some students can achieve the desired level of proficiency in two years instead of three, as required by other students.

The sketch (Fig. 5.22) show below an area for instruc-

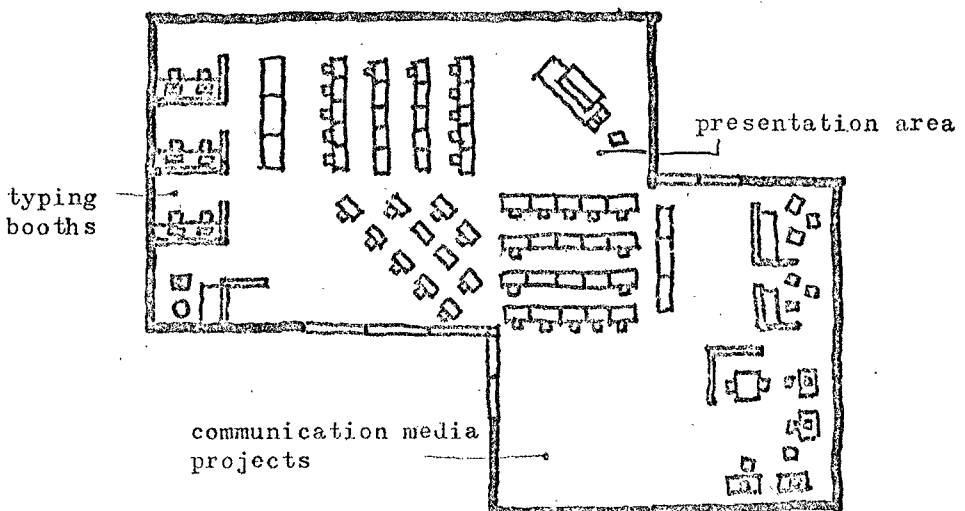


Fig. 5.22 An Arrangement of Typing Center

tion in typing -- an almost essential skill -- easily learned without much formal instruction. The typing room is especially equipped with audio-visual aids for instruction with large groups. The value of the room is augmented by small booths where students can work on various assignments in comparatively isolated surroundings. ((4) p.56)

(2) Business and English Combination

The sketch (Fig. 5.23) shown below is an arrangement in which the business education teacher and the English teacher

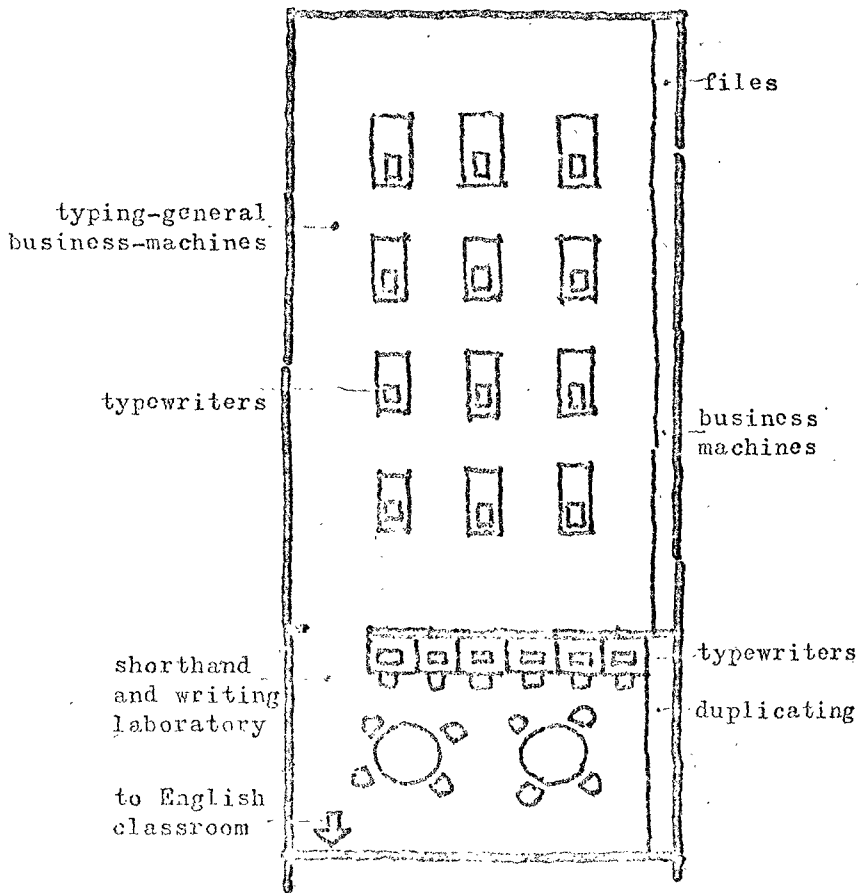


Fig. 5.23 A Business Education Classroom with Joint Use of Facilities with English



can have the joint use of space. The small room serves as a classroom for shorthand writing and other business subjects, as well as a writing laboratory for English. It is also the publication room for newspaper and yearbook. At times, the room could be used entirely by English or business students, At other times it can be used by both the English and business students.

((14) p.28)

(3) Multi-Class Teaching

For a school with fewer than 50 students, a convertible classroom can be used to combine English, foreign languages, and

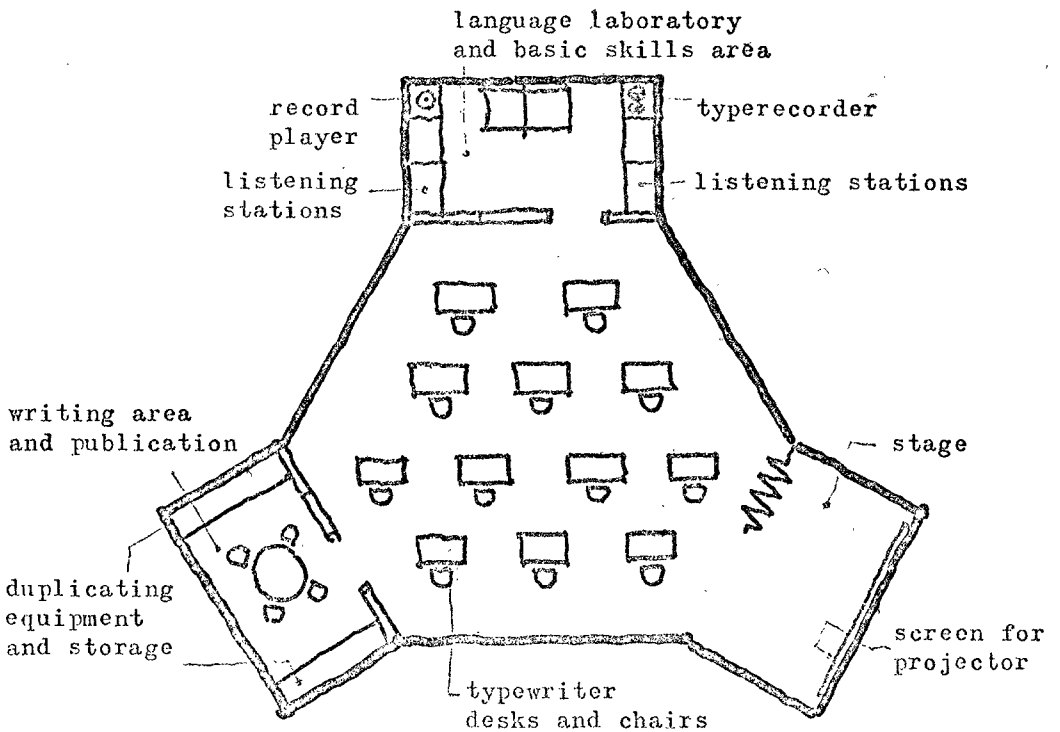


Fig. 5.24 A Multiple Classroom for English, Foreign Language and Business Education

business education. The sketch (Fig. 5.24) above shows this concept. The combination classroom provides for all of the essential activities. The alcoves in this room provide the necessary areas for special work such as seminars. ((14) p. 41)

#### 5.6 SOCIAL SCIENCE

Social science is the study of human social structure and relationships. This subject can be taught in a room for English or general-purpose. The important elements to consider here are flexible furniture, storage space for reference books, and the arrangement of television screens so that there will be no more than eight or ten students viewing at any screen. It should be possible to pull a curtain or folding wall across the room so that a group can view a film without disturbing the rest of the students engaged in other kinds of learning activities.

#### 5.7 PHYSICAL EDUCATION

Physical education is a subject that teaches gymnastics, athletics, sports and body-building exercises (especial those performed with special apparatus in a gymnasium). Facilities provided for the teaching of this subject are gymnasium, apparatus, court for ball-games and stadium.

A large gymnasium is often used flexibly. For instance, it can be used for another facilities such as cafeteia, auditorium, or for teaching classes if it is suitably divided. In

most instances, the decision to build a large gymnasium is not based upon educational consideration. The school can provide a basic physical education program which stresses individual and small-group activities with or without a full-size basketball court and the spectator seating area which are required for an athletic program.

The detailed consideration for this space problem is discussed in "6.1 GYMNASIUM" and an example is shown on Fig. 6.1.