For some time the faculty of the clothing department at Oregon State College has felt a need for improved conditions in the clothing laboratories. Due to the fact that plans would soon be under way for the remodeling of the Home Economics building, it seemed fitting to make a study of the possibilities of rearranging the present equipment for greater efficiency.

In the present college laboratories the equipment is widely separated, necessitating a great number of steps in the construction of a garment.

In order to eliminate unnecessary steps, the sewing unit arrangement plan was set up. Under this setup the sewing machine, work table, iron and ironing board, and an improved box to provide shelves for storing pressing equipment were so placed that little distance was traveled between the equipment to be used. The unit arrangement was set up in the sophomore clothing laboratory, due to the special interest shown by a faculty member.

The aim of the study was to compare the amount of time used in the construction of similar garments under the present laboratory conditions as with the sewing unit arrangement.

The investigator made a study of the laboratory and drew up tentative plans for possible unit arrangements. Since the electrical outlet was permanent and since no funds were available for additional equipment, or change in the wiring, the plan where the machine and the iron could be hooked up to the same outlet was used.

The southeast corner of the laboratory was chosen for the unit. This was near the electrical outlet and away from the normal activity of the laboratory.
During the winter term the girls who were to work in the unit were students of average ability. The class grade point from previous clothing courses was obtained to determine the abilities of the students working in the laboratory as well as in the unit.

In the spring term volunteers were requested for obtaining girls to work in the unit. Information on the students' previous sewing experience was obtained from the questionnaire. Grade point averages of previous work in clothing courses were also obtained for all the students in the class. This information was necessary to pair off the two girls in the unit with two girls of similar ability in the laboratory, for the comparative study.

Observations were made during the winter and spring terms. A time schedule was kept each day for each student. The number of hours worked outside of class was totaled at the end of the term.

The investigator found that the unit arrangement eliminated travel and lowered the number of hours of waiting. The girls in the unit had greater convenience in the use of the equipment. The expense of setting up the unit was negligible since temporary equipment was used.

In the winter term the result of the study indicated an average saving of 14 hours by the students working in the unit as compared with the students of the laboratory. However, in the spring term a reverse was shown due to motivations of another source.

It is evident that the unit arrangement was preferred over the general laboratory set up. Many students and the staff alike expressed great interest in the unit as ideal for both the laboratory and the home.
AN EXPERIMENTAL STUDY OF THE UNIT
ARRANGEMENT FOR CLOTHING LABORATORIES
AT OREGON STATE COLLEGE

by

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A THESIS
submitted to
OREGON STATE COLLEGE

in partial fulfillment of
the requirements for the
degree of
MASTER OF SCIENCE
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APPROVED:

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Dean of Graduate School

Date thesis is presented: August 7, 1950

Typed by Audrey L. Rickard
ACKNOWLEDGEMENTS

The author wishes to express appreciation to the students of the sophomore clothing class, to Miss Ruth Moser, to Miss Maude Wilson, and to Miss Elizabeth Birong whose helpful cooperation made this study possible.

A special expression of gratitude goes to Miss Dorothy Gatton for her untiring assistance and inspiration throughout the whole study.
# TABLE OF CONTENTS

CHAPTER I. INTRODUCTION TO THE STUDY ........................................ 1
- Statement of the Problem ......................................................... 4
- Method of Procedure ................................................................ 5
- Limitation of the Study .............................................................. 14
- Photographs of the Laboratory ................................................ 16, 17, 18
- Photographs of the Pressing Room .......................................... 19, 20
- Photographs of the Unit Arrangement ...................................... 21, 22

CHAPTER II. VALUES OF THE UNIT ARRANGEMENT ............................. 23
- Values of the Unit Arrangement to the Student ....................... 23
- Values of the Unit Arrangement to the Teacher ...................... 24

CHAPTER III. SUMMARY AND CONCLUSIONS .................................... 25
- Literature Cited ........................................................................ 28
- Bibliography ............................................................................ 29
- Appendices ............................................................................. 30
- Appendix 1 ............................................................................ 30
- Questionnaire .......................................................................... 31
- Time Schedule, Winter Term 1950 ....................................... 34
- Time Schedule, Spring Term 1950 ....................................... 35
Table of contents continued

LIST OF DIAGRAMS

Unit Plans ........................................ 6
Travel Diagram ................................. 13
Clothing Laboratory - Unit Plan Basis ...... 27
INTRODUCTION TO THE STUDY

The present trend toward efficiency in the industrial world has created interest in the working conditions of the homemaker. "The accepted fact today is that every housewife ought to become as proficient in her realm, as the business man is in his. As a man can not do good work without the best facilities and the most useful organization in his office, so the housewife is handicapped unless her workshop is suitably planned and arranged." (1, p.1)

For some time industry has sought to create conditions whereby greater production and saving of time might be obtained through reorganizing and rearranging the equipment. For example: in the assembling of one model of a radio it was found that by shortening by six inches the distance required to reach the parts there was a saving in time of 34,000 hours per year and a saving in distance of 98,500 miles per year. Improving methods for packing books in shipping cartons resulted in a saving of 22 per cent in time, a saving of 43 per cent in amount of tape used. This not only produced a neater package but one that is several times stronger than the original one. Many such experiments are
cited in Barnes, *Motion and Time Study.* (2, pp. 235-236 and p. 239) Indications of these time and labor-saving procedures should be of benefit to industry and the homemaker as well.

"In these busy times no one can afford to spend all day doing housework, or to neglect it because of outside activities. A good manager in the home works quickly and easily, gets the job done and has time left for other things.

"Almost everyone can learn to be more efficient. There is a short and easy way to every task. Unnecessary motions and steps need to be eliminated. Equipment should be arranged so it is stored at the place where it is used."

(4, p. 1)

Sewing is one activity which can be carried on efficiently in the home if the conditions are convenient and pleasant. Often the equipment is spread all over the house- hold. The ironing board may be in the kitchen, the sewing machine may be in the bedroom, and the cutting table may be in the dining room. The small equipment, like shears, tape-line, thread, and buttons may be almost anywhere. With an arrangement like that, sewing could hardly be called pleasant.

Miss Julia Brekke gives as her first requirement for sewing, "a convenient place where one can assemble the necessary equipment." (3, p. 2)
Many homemaking teachers have expressed concern over the present condition in the clothing department. Under the present laboratory conditions the cutting tables are down the center of the room; the sewing machines are near the windows, and the ironing boards are usually in an adjoining room. A considerable distance must be traveled to reach any of the equipment to be used.

In order to eliminate unnecessary steps the sewing unit arrangement plan has been set up in several schools for experimental purposes. Satisfactory results have been reported from Montana State College, Bozeman, Montana; the State College, Logan, Utah; and University of California, Davis, California.

Under this setup the sewing machine, work table, and ironing board are so placed that little distance is traveled between any of the equipment to be used. A unit may be set up for two or more students as the size of the class may demand. An arrangement like this seems ideal from the standpoint of conserving time and energy.

The aim of this study is to compare the amount of time used in the construction of similar garments under the conventional laboratory conditions with that used under the sewing unit arrangement. The writer hopes that this study will prove valuable to persons desiring to make improvements in clothing laboratories where minimum expenditures are allowed.
STATEMENT OF THE PROBLEM

For some time the faculty of the clothing department at Oregon State College has felt the need for improvement in the clothing laboratories. In view of the fact that plans will soon be under way for remodeling the Home Economics building, it seemed fitting to make a study of the possibilities of rearranging the present equipment for greater efficiency. Much study has been given to planning foods laboratories. The unit kitchen plan has become the accepted arrangement. However, very little has been done in the rearrangement of clothing laboratories. Therefore a sewing unit arrangement was set up with the purpose of studying the changed working conditions.

LOCATION OF STUDY

The study was made in a clothing laboratory in the Home Economics building at Oregon State College.

MATERIALS USED

Laboratory equipment as such:

- work table
- ironing board
- storage cabinet
- iron
- sewing machine
- chairs

CONDITIONS OF THE STUDY

A unit arrangement was set up with two girls working
in the unit. A comparative study was made of the girls working in the unit arrangement and of the girls working in the laboratory as it is equipped at present.

METHOD OF PROCEDURE

As plans for the new wing were definitely under way the clothing staff wanted an experimental study made of the unit arrangement. Because of Miss Moser's willingness and cooperation, the unit was set up in the sophomore clothing laboratory.

WINTER TERM 1950

At first it took some time to plan the unit since there was little, if any, written material available.

The investigator made a study of the laboratory and its arrangement, and drew up tentative plans for possible unit arrangements which could be used. On the following page are three of such plans.
UNIT PLAN NO. 1

UNIT PLAN NO. 2

UNIT PLAN NO. 3

SUGGESTED PLANS FOR UNIT ARRANGEMENTS
SCALE 1/4" = 1'-0"
DESIGNED BY: M. SHERMAN
Plan No. III was chosen for the experimental study. According to this plan the machine and iron could be hooked up to the same outlet. The location of the electrical outlet was permanent, and since no money was available for any additional equipment or change in wiring, it was advisable to adapt the plan to this condition.

The southeast corner of the laboratory was chosen for the placement of the unit. This location was near the electrical outlet and caused no interference with the normal work of the laboratory.

To set up the unit, it was necessary to obtain suitable equipment. The tables in the clothing laboratory will serve three people, these were longer than what was needed for the unit. After some search through the building a table suitable for two people was found, and was moved into the selected corner. One of the regular sewing machines from the laboratory was used. An iron and ironing board were borrowed from the textile laboratory. In order to store the pressing cloths and such equipment it was necessary to improvise a cardboard box to provide shelves. A shelf was placed in the middle of the box to form two divisions in which equipment could be placed.

Plans for the project were discussed with the class. Two girls were invited to work in the unit. It was decided that students of average ability working in the unit should be compared with the class. The class grade point from
previous clothing courses was obtained to determine the abilities of the students working in the laboratory as well as of students in the unit. A transfer student whose grades in clothing courses were not available at the time was chosen to work in the unit. A girl who had had her previous clothing construction at Oregon State and had a B average in clothing was chosen as the second member of the unit.

A time schedule was kept each day by each student in the class showing the hours worked on her garment outside of class.

The writer observed the class every day during the winter term of 1950. Some valuable information was gained by observing the students at work. One could sense that a girl in the laboratory felt rushed and somewhat anxious, while the girls of the unit appeared to have a sense of security.

OBSERVATIONS MADE OF THE GIRLS IN THE LABORATORY SETUP

A student had to travel each time she needed to use the sewing machine or iron.

She often had to wait her turn in order to use the sewing machine or iron.

Before she could do any stitching she had to adjust and thread her machine.
OBSERVATIONS MADE OF THE GIRLS IN THE UNIT

The girls had a definite work space with no travel involved.

They could thread and adjust their own machine and spend little if any time waiting for the iron.

It was obvious that there was more traveling and more waiting done by the students of the laboratory than by the students in the unit.

There seemed to be a better spirit of cooperation and friendliness among the girls of the unit arrangement. There was no irritation brought on by having to wait, and as a result, a better spirit prevailed.

At the close of the winter term, the hours worked outside of class time were averaged for the students of the laboratory as well as for the students of the unit. It was found that the girls in the unit saved a total of fourteen hours over the girls in the laboratory. The average grades received by the girls in the unit were higher than the average grades received by those in the laboratory.

At the close of the winter term, after conferring with the staff, it was felt that observation of one term only was not sufficient. It was decided to continue the observations with another class during the spring term.
SPRING TERM 1950

This study varied somewhat from that of the winter term. During this term two girls of the unit were compared with two girls of the laboratory.

To obtain girls to work in the unit volunteers were requested. Information on the students' previous sewing experience was obtained from the questionnaire. The grade point average of previous work in clothing courses was also obtained for all the students in the class. This information was needed in order to compare the work of the two girls in the unit with that of two girls of similar ability in the laboratory.

INFORMATION ON CLASS SEWING EXPERIENCES

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<th>Experience</th>
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<th>Two</th>
<th>Three</th>
<th>Four</th>
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<td>6</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Terms in College</td>
<td>5</td>
<td>12</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sewing for Others</td>
<td>13</td>
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<td>7</td>
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<tr>
<td>Number with some experience</td>
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<td>20</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Results of the questionnaire show that most of the students have had clothing courses either in high school or college. On the average, their backgrounds seemed to be similar.
In the early part of the spring term the students were given a questionnaire and were asked to give suggestions for the rearrangement of the clothing laboratory. Most of the girls had worked under the general laboratory conditions previously. See appendix for the typical suggestions.

A time schedule was kept each day for each student. The number of hours worked outside of the class period was totaled at the end of the term.

The investigator observed the class each day of the spring term. The student was clocked an entire two-hour laboratory period. The following schedule shows the typical activities of the students being timed in the laboratory:

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 - 8:30</td>
<td>Class demonstration by instructor</td>
</tr>
<tr>
<td>8:30 - 8:35</td>
<td>Assisting partner with fitting problem</td>
</tr>
<tr>
<td>8:35 - 8:45</td>
<td>Observing instructor as she fits the partner</td>
</tr>
<tr>
<td>8:45 - 8:50</td>
<td>Bending over her work at the table</td>
</tr>
<tr>
<td>8:50 - 9:05</td>
<td>Assisting instructor with fitting</td>
</tr>
<tr>
<td>9:05 - 9:25</td>
<td>Sewing at machine</td>
</tr>
<tr>
<td>9:25 - 9:30</td>
<td>At mirror</td>
</tr>
<tr>
<td>9:30 - 9:31</td>
<td>Returning to her table</td>
</tr>
<tr>
<td>9:31 - 9:40</td>
<td>Discussing problem with partner</td>
</tr>
<tr>
<td>9:40 - 9:45</td>
<td>Waiting for instructor</td>
</tr>
<tr>
<td>9:45 - 9:50</td>
<td>Gathering up sewing materials at end of class period</td>
</tr>
</tbody>
</table>

ACTIVITIES OF THE STUDENT BEING TIMED IN THE UNIT

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 - 8:30</td>
<td>Class demonstration by the instructor</td>
</tr>
<tr>
<td>8:30 - 8:40</td>
<td>Basting garment at the work table</td>
</tr>
<tr>
<td>8:40 - 8:43</td>
<td>Discussing problem with partner</td>
</tr>
<tr>
<td>8:45 - 9:04</td>
<td>Sewing at the machine</td>
</tr>
<tr>
<td>9:04 - 9:06</td>
<td>Pressing</td>
</tr>
</tbody>
</table>
9:06 - 9:09  Discussing problems with partner
9:09 - 9:10  Pressing
9:10 - 9:31  Hand sewing at the table
9:31 - 9:40  Getting assistance from the instructor at the machine
9:40 - 9:50  Handwork at the table

The following diagram indicates the distance traveled by the two students who were timed during the same two-hour laboratory period.
DIAGRAM OF TRAVEL IN A TWO HOUR LABORATORY PERIOD
CLOTHING LABORATORY ROOM 215
LABORATORY STUDENT
STUDENT IN EXPERIMENTAL UNIT

SCALE 1/4" = 1'-0"

DESIGNED BY: M. SHERMAN
At the close of the spring term a comparison was made of the time used outside of class by the two students of the laboratory and the two students in the unit. It was found that the two girls in the regular laboratory setup had saved 32 hours more than had the two girls in the unit.

In spite of the difference in the distance traveled and the advantage of the girls in the unit, the girls in the laboratory were ahead. It is interesting to note here the possible reasons which might have motivated the girls in the laboratory to increase their speed and to make wise use of their time. In order for one girl to attend her brother's graduation at West Point, it was necessary for her to complete her garment early. Because the other girl was a graduating senior she had to complete her work early also. Motivation of this type increased their productivity in spite of the disadvantages of the laboratory.

Great interest was shown in the unit by the entire class. Many students stated that they would like to use this idea in their own home or in further work in the field of home economics.

LIMITATIONS OF THE STUDY

This was primarily an experimental study of the unit arrangement at Oregon State College. An attempt was made to find an arrangement that would be suitable and efficient for the students to use in the clothing laboratory.
The students expressed a desire for more experience in the unit setup. They felt that the class periods were too short for them to accomplish the amount of work they desired.
The Sophomore Clothing Laboratory
The Sophomore Clothing Laboratory
The Sophomore Clothing Laboratory
The Pressing Room
The Pressing Room
The Unit Arrangement
The Unit Arrangement
Chapter II

VALUES OF THE UNIT ARRANGEMENT

The values of the unit arrangement may be expressed from the standpoint of the student as well as of the teacher.

VALUES OF THE UNIT ARRANGEMENT TO THE STUDENT

One advantage to the student is that the unit arrangement provides a definite work space. All the equipment which will be used is close at hand. This arrangement eliminates unnecessary steps and thus conserves both time and energy.

Another value of this arrangement is that students spend little or no time waiting for the iron or other equipment. The student is not forced to rush his work in order to give others their turn. The investigator found that during the winter term the time spent in the unit averaged 14 hours less than the time spent in the laboratory in the construction of similar garments under similar conditions.

A third advantage of the unit to the pupil is that the careful arrangement of equipment appeals to the students. They like to work in areas conveniently arranged, where the greatest amount of time and energy can be saved.

A fourth value is that students are provided an opportunity to develop efficient work habits. Students may
eventually use this plan in their own home sewing units. A sewing area can easily be set up with little or no expense.

VALUES OF THE UNIT ARRANGEMENT TO THE TEACHER

One advantage to the teacher is that well-arranged equipment will give her a feeling of satisfaction and a desire to remain in the profession.

Another advantage is that the teacher has a better sense of achievement when students are able to maintain good standards in the use of time, and when they acquire better habits of work.
Chapter III

SUMMARY AND CONCLUSIONS

The unit arrangement plan was set up in a sophomore clothing laboratory at Oregon State College as an experiment to determine the value of such a setup for future laboratories at Oregon State College.

In the present college laboratories the equipment is widely separated, necessitating a great number of steps in the construction of a garment.

The unit arrangement eliminated travel and lowered the number of hours of waiting. The expense of setting up such an experimental unit was negligible since temporary equipment was used. The unit proved to be both satisfactory and pleasant to the students and teacher alike.

A result of this study indicates that there was an average saving of 14 hours by students working in the unit in the winter term as compared with the time spent by students in the laboratory. However, in the spring term a reverse was shown which was probably caused by motivations of another source.

It may be concluded from this study that the unit arrangement reduced the distance traveled considerably.

It is evident that the unit arrangement was preferred to the general laboratory setup. Many students and the staff alike expressed great interest in the unit and stated
their desire to include this plan in their future work in Home Economics.

The investigator feels that there are still many problems in a study of this kind to be explored. The questions concerning lighting, table heights, and the choice of chairs would present a possible problem in research, and would be helpful in improving the unit even more.

In closing, a suggested plan for the unit arrangement to be used in the clothing laboratory at Oregon State is submitted. It can be easily seen by this drawing that the expense would be prohibitive at the present time.

Each clothing laboratory presents a different problem in arrangement, but by giving thought and consideration some pleasing results may be obtained. If the best arrangement is made for a given situation, time and energy can be conserved. Sewing may then become a pleasing and profitable adventure.
CLOTHING LABORATORY - ROOM 215

UNIT PLAN BASIS  SCALE 1/4" = 1'-0"
AREA MEASUREMENT PER UNIT  6'-0" x 7'-0"
NOTE: NO AREA LEFT FOR BLACKBOARD BEHIND DESK
MOovable DOUBLE FACED BLACKBOARD SUGGESTED

ALTERNATIVE SUGGESTION:
1. USE PRESENT BULLETIN WALL FOR WARDROBE
   CLOSET AND BUILT-IN STORAGE AND USE OUTER
   SURFACE OF DOORS FOR BULLETIN BOARD PURPOSES

TEN UNIT AREAS FOR EACH TWO GIRLS PROVIDING:
1. SEWING MACHINE FOR TWO GIRLS
2. TOTE TRAY SPACE, TRAY TO BE TRANSFERRED FROM
   LOCKER STORAGE AREA TO SPACE UNDER TABLE
1. SMALL IRONING BOARD ATTACHED TO TABLE
1. IRON & SPACE FOR SAME & PRESSING PAD, ETC.
2. OPEN RECESSED SPACE FOR NOTEBOOKS, ETC.
   ONE FOR EACH STUDENT.
2. CHAIRS-SWIivel & ON ROLLERS

MACHINE - 3'-0" x 16'-0"
TABLE - 60'-0" x 4'-0"
DESK - 10'-5'-0" x 3'-6'-0"
HEIGHT TO LOWER SIDE OF MACHINE LEAF WHEN OPEN - 2'-0"

DESIGNED BY: RUTH MOSER
LITERATURE CITED


APPENDICES

Appendix 1. Questionnaire and Time Schedule.
QUESTIONNAIRE

Since we are planning for the rearrangement of the clothing laboratories, we should appreciate as many helpful suggestions from you as possible. Please answer questions listed below:

1. How may we cut down on unnecessary time in our laboratories?

2. How may we make sewing less tiring?

3. How may we make it more pleasant?

4. What are your suggestions for saving time and energy?

YOUR SEWING EXPERIENCE

1. How many semesters of sewing have you had in high school?_________terms in college?_______.

2. Do you like to sew?__________________________.

3. Will you make an estimate of the number of garments you have made since your first high school course?_______________________________.

4. Have you done any sewing for others?_________.
   How much?_________________________________.
SUGGESTIONS FROM THE QUESTIONNAIRE

OPINIONS RELATIVE TO CUTTING DOWN UNNECESSARY TIME IN THE LABORATORY

"have another person in the laboratory (e.g. a graduate student) who could also help us, thus eliminating some of the long time for checking."

"have smaller classes, making checking quicker."

"unit arrangement would be helpful."

"cutting down lecture time by using mimeographed lesson sheets, allowing more time for individual help."

"need for more ironing boards to avoid waiting."

OPINIONS RELATIVE TO MAKING SEWING LESS TIRING

"better lighting."

"making explanations and instructions as brief as possible."

"providing a more convenient location for equipment by having sewing units."

"more comfortable chairs would help."

OPINIONS RELATIVE TO MAKING SEWING MORE PLEASANT IN THE LABORATORY

"having more time to work in the laboratory."

"not more than one hour of lecture."

"attractive bulletin board arrangements."

"tables of better heights."
OPINIONS CONCERNING SUGGESTIONS FOR SAVING TIME AND ENERGY

"a sewing unit arrangement would be helpful."

"more mirrors for fitting."

"having two 3-hour laboratories to avoid starting and stopping so often."

"make as many short cuts as possible and still turn out a good product."

"better planning on part of the student."
Student please list hours worked on garment outside of class.

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TIME SCHEDULE

SPRING TERM 1950

Students please list hours worked on garment outside of class.

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