

PLAN FOR A UNIT SEWING AREA IN A CLOTHING
LABORATORY BASED UPON JOB ANALYSIS

by

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INTRODUCTION

Many clothing laboratories could be improved if careful planning and consideration were given to the arrangement of equipment, storage and work area. Organizing all work into one unit can save time and energy, and make the work easier.

Interest in clothing construction is often lost as a result of an inefficient sewing center. Correct arrangement of tools and supplies, comfortable working conditions, efficient storage facilities, and a well organized work area will encourage a better job of sewing.

This report has been concerned with one way to arrange a unit sewing area for a clothing laboratory. The plan for the unit is based upon an analysis of the problems concerned with the construction of a basic cotton dress. By analyzing the procedures necessary for the construction of such a garment the optimum sewing equipment and supplies may be determined as well as the space needed for storage of equipment and the necessary work area.

Attention has been focused on meeting the needs of the student as she works at the task of garment construction. Emphasis was placed upon the maximum development of the student rather than economy. With this in mind, factors of cost were eliminated in planning the sewing unit.

PROBLEMS CONCERNED WITH THE CONSTRUCTION
OF A BASIC COTTON DRESS

The "basic dress" is generally thought of as one which can be quickly changed by accessories to "dress it up" or "dress it down" for various occasions. It is a dress designed to give the wearer a feeling of change, and to serve as a suitable background for special pieces of jewelry. A slim skirt, neat waistline, and a simple collarless neckline seem to be the prime requisites (Erwin, 3, p. 164).

The dress constructed for the analysis of the job was made from pre-shrunk cotton fabric. A four gore skirt, button-front bodice, convertible collar, and short set-in sleeves is descriptive of the design used (Plate I).

Before undertaking the specific problems concerned with the construction of the dress, attention was focused upon the analysis of the job. Job analysis consists of stating the conditions of the task and analyzing the procedures for carrying them out.

An effort to lower time and energy expenditure in accomplishing a task results in an improvement in work methods. Work simplification studies consist of making motion and time studies of the task as it is being done, analyzing the work methods, developing the easiest and most effective way of doing the task, and putting the new method into use (Nickell and Dorsey, 7, p. 174).

Using such work simplification techniques as were known, the cotton dress was constructed. The problems concerned with

the construction of this dress began with the preparation of the pattern and carried through to the final step of pressing the finished dress. The Bishop Method of clothing construction or the unit method was followed.

Unit construction means to complete and press each section of a garment before it is joined to another section. There were many advantages in using the unit method of construction. It reduced the handling of fabric pieces, increased the speed in assembling a garment, and psychologically it increased the worker's interest as she gained the feeling of accomplishment when she had completed one unit (Bishop, 2, p. 5).

The four gore skirt was the first unit constructed because the skirt was the simplest of the two units. It is believed that the student could develop a "hand" for the fabric with which she is working, besides permitting the skirt to hang and the fabric to stretch downward for best results in hemming.

The second unit constructed was the blouse, first the back and then the front. The joining of these two units and the joining of the collar and sleeve sections were the final steps in constructing the blouse.

The third and final step in the unit construction of the dress was the joining of the blouse and skirt which involved waistline finishes. Application of the zipper and the final finishes such as the hem, sewing on buttons and fasteners were included in this step.

A tentative arrangement of the sewing area was made and a list of what the writer believed to be adequate equipment

EXPLANATION OF PLATE I

Basic Design Used for Making the Dress.

PLATE I



determined. The construction of the dress followed the tentative plan.

JOB ANALYSIS

It was assumed that the work center was the scene of productive activity. In this setting the worker's tools for doing a specific job were assembled in such a way as to assist in developing a good product, conserving the worker's energy and time, and maintaining his body in the best position possible. Maximum efficiency within the work center is the result of planning, according to Agan (1, p. 328). The basic steps of planning are

1. Analyze the job to be done.
2. Specify the equipment and supplies necessary or available.
3. Arrange the equipment and supplies in the relation to the sequence required for the job.
4. Place the equipment and supplies in relation to the human figure and its ability to use it at that position.
5. Measure the amount of space necessary for the equipment and supplies.
6. Allow sufficient room for passing between the elements for one or more persons.
7. Supply other features which contribute to health or enjoyment, as proper temperature and ventilation, light, comfortable floor, and others.

The analysis of the task of making the basic dress is presented on the following pages:

JOB ANALYSIS: Making a Simple Cotton Dress from Preshrunk Cotton Fabric with Equipment Pre-positioned.

PROCESSES

Preparation of Pattern for Use:

Write name on pattern envelope and each pattern piece, place name under pattern number.

Circle pattern lay-out.

Select pattern pieces to be used.

Put extra pattern pieces back into envelope. Press pattern.

Pin pattern together.

Check fit of pattern.

Make necessary alterations.

Take pattern apart, press ready for cutting garment.

Preparation of Fabric for Use:

Straighten grain of fabric at each end (pulling thread or tearing).

Lay fabric on cutting table.

Fold right sides together, check for evenness.

OPTIMUM EQUIPMENT AND SUPPLIES

Pencil, pattern envelope, pattern pieces.

Pencil and pattern lay-out.

Pattern lay-out, pattern pieces.

Pattern pieces, pattern envelope.
Pattern pieces, iron, ironing board.

Wrist pin cushion, pins, pattern.

Pattern, pin cushion, pins, dress form.

No alterations made.

Pattern, wrist pin cushion, iron, ironing board.

Fabric, pin (to start pulling thread).

Fabric, cutting table.

Preparation for cutting:

With fabric spread out on cutting table, keep selvages and ends parallel with edges of table, place pattern pieces on fabric. Measure from selvage to grain in at least two places and pin on grain line at two places.

Check pattern layout, pin pattern on permanently, placing pins perpendicular to edges.

Cutting:

Check grain line and pin.

Mark any increase in seam allowance.

Using sharp cutting shears, cut around pattern with smooth long slashes. Indicate notches by cutting a small "v" outward from garment piece. Cut any reinforcements or interfacings needed.

Roll up excess material and pin together. Place in drawer.

Dispose of small scraps.

Fold each piece as it is cut, leaving pattern attached. Place on sewing table.

Obtain small sewing equipment.

Fabric, cutting table, pattern pieces, square rule or yardstick, pins, pin cushion, pattern lay-out.

Fabric, cutting table, pattern layout, pattern pieces, pins, pin cushion.

Pattern pieces, cutting table, fabric, pattern layout, pins, pin cushion, rule or yardstick.

Tailor's chalk and rule, fabric, pattern, and cutting table.

Shears, pattern, fabric, cutting table.

Fabric, pins, cutting table, drawer.

Waste container, scraps.

Fabric, pattern, sewing table.

Pins, needles, pin cushion, tailor's chalk tracing wheel, and paper, tracing board, lap board, tape measure or gauge.

Marking:

Sitting at sewing table, mark before removing pattern:

- a. Center front and center back
- b. Location of buttons and buttonholes.
- c. Sleeve curve.
- d. Dart line.
- e. Pocket positions.
- f. Any design features indicated in pattern.

Use tracing wheel, tracing paper, ruler for straight lines.

Set up sewing machine. Fill bobbin. Attach sewing guide.

Study instruction sheet.

UNIT CONSTRUCTION OF BASIC COTTON DRESS:

Unit I - A. Skirt Front:

Remove pins and pattern from skirt front. Place pattern in envelope.

Staystitch waist and hip line edges.

Clip threads.

Permanently stitch center front seam.

Place skirt front aside.

Chair, lap board, tracing wheel, tracing paper, rule, tracing board, fabric, pattern, pin cushion, perforation marker, armseye curve.

Sewing machine, waste container, scissors, matching thread, stitching guide.

Instruction sheet.

Sewing table, pins, pin cushion, pattern envelope, chair.

Sewing machine, thread, skirt front, chair.

Scissors, waste container.

Sewing machine, thread, fabric, pins, pin cushion, scissors, waste container.

Sewing table, drawer or box.

B. Skirt Back:

- Remove pins and pattern from skirt back.
Place pattern into envelope, pins in pin cushion.
- Staystitch waist and hip line edges.
- Construct dart, tie threads.
- Permanently stitch center back seam.
- Pink center front and center back seams of skirt.
- Press open center front and center back seams in direction stitched. Use directional pressing.
- Joining skirt front and skirt back:
- Pin baste skirt side seams.
- Baste-stitch side seams of skirt leaving left side open above notch for placket. Remove pins, put into pin cushion.
- Anchor stay tape to skirt at waist line.
- Pit and make any necessary alterations.
- Permanently stitch side seams, leaving left side open above perforations.
- Pin cushion, skirt back, pattern, pattern envelope.
- Sewing machine, thread, skirt back, chair, scissors, waste container.
- Pin cushion, scissors, waste container, sewing machine.
- Sewing machine, threads, skirt back, pins and pin cushion, shears, scissors, chair.
- Pinking shears, waste container, skirt unit.
- Skirt back, skirt front, iron, ironing board, seam board.
- Pins, pin cushion, skirt front, skirt back.
- Sewing machine, thread, skirt front, skirt back, pins, pin cushion, scissors, waste container, chair.
- Stay tape, pins, pin cushion.
- Assembled skirt, mannequin or dress form, pins, pin cushion, mirror, shears.
- Sewing machine, thread, chair, scissors, waste container.

Remove bastings, discard thread.

Press seams open.

Hang skirt in storage closet.

Waste basket, skirt.
Iron, ironing board, seam board,
skirt.

Clothes hanger, pins, pin cushion,
storage closet, skirt.

UNIT CONSTRUCTION OF THE BLOUSE

Unit II - A. Blouse back.

Check for all pattern markings.

Pattern folded in fabric, pin cushion.

Remove pattern from blouse back, place
pattern in envelope, pins in cushion

Pin cushion, pattern envelope, pattern,
blouse back.

Stay-stitch:

- a. Neckline
- b. Shoulder line
- c. Armscye

Sewing machine, thread, blouse back,
chair, waste container, pattern,
scissors.

Pin baste darts.

Pin cushion, pins, blouse back.

Machine baste darts.

Sewing machine, thread, pin cushion,
waste container, chair, scissors,
hinged presser foot.

B. Blouse front:

Check for all pattern markings.

Pattern folded in fabric, pin cushion.

Remove pattern from blouse front. Place
pattern in envelope, pins in cushion.

Blouse front, pattern, pattern envelope,
pin cushion.

Stay-stitch:

- a. Neckline.
- b. Shoulder line.
- c. Armscye.

Sewing machine, thread, chair, scissors, waste container, blouse front.

Machine baste center front line and fold line.

Blouse front, sewing machine, thread, scissors, waste container, chair.

C. Blouse front-facing.

Remove facing from pattern, place pattern in envelope, pins in cushion.

Blouse facing, pattern, pattern envelope pin cushion.

Check for all pattern markings.

Pattern and garment pieces.

Clean finish facing edge. (Press back 1/4" fold and stitch.)

Iron, ironing board, sewing machine, blouse, thread, scissors, waste container chair.

Stay-stitch neckline facing, 1/4" from edge.

Sewing machine, thread, scissors, waste container, chair, blouse.

Turn under edge on stay-stitching of facing front, and edge stitch (under stitch).

Blouse facing, sewing machine, matching thread, chair, scissors, waste container.

Apply reinforcement for buttonholes and buttons.

- a. Place reinforcement for buttonholes and buttons on wrong side of facing next to fold line.

Reinforcements, blouse front, pins, pin cushion, chair.

- b. Machine stitch top, bottom and inside line.

Blouse front facing, reinforcements, sewing machine, chair, thread, pin cushion, scissors, waste container.

- c. Press.
- d. Apply facing to blouse front.
- e. Press seam open, trim to 1/4".
- f. Understitch.

Machine mark position for buttons and buttonholes.

Pin baste darts.

Machine baste darts.

D. Joining back and front:

Pin baste shoulder seams and underarm seams.

Machine baste shoulder seams and underarm seams.

E. First fitting:

Pin on center front line for closing blouse.

Iron, ironing board, blouse front-facing.

Sewing machine, thread, chair, blouse facing, blouse front, scissors, waste container.

Iron, ironing board, scissors, waste container.

Sewing machine, thread, chair, blouse front, scissors, waste container.

Sewing machine, chair, thread, scissors, waste container.

Pins, pin cushion, blouse front.

Sewing machine, thread, chair, blouse front, pin cushion, scissors, waste container.

Blouse front, blouse back, pins, pin cushion.

Blouse front, blouse back, sewing machine thread, chair, waste container, scissors.

Dress form, blouse unit, pins, pin cushion.

Check fit of the following:

- a. Circumference: bust, hips, waist.
- b. Shoulder line.
- c. Neckline.
- d. Armscye.

Check placement of:

- a. Darts.
- b. Buttonholes.
- c. Pockets.

F. Machine stitch darts:

Remove bastings, discard threads.

G. Machine stitch shoulder seam and underarm seam.

Remove bastings, discard threads

Clip underarm seam at natural waistline and reinforce.

Press seams, darts and fold line.

H. Collar preparation:

Check markings. Remove pattern, put pattern into envelope.

Pin baste along unnotched edges of collar section, right sides together.

Machine stitch, put pins into cushion.

Dress form, blouse unit, pins, pin cushion, mirror.

Dress form, blouse unit, pins, pin cushion, mirror.

Sewing machine, thread, chair, blouse unit, scissors, waste container.

Sewing machine, thread, chair, blouse unit, scissors, waste container.

Waste container.

Scissors, blouse unit, sewing machine and matching thread.

Iron, ironing board, seam roll.

Pattern pieces, fabric, pattern envelope, pin cushion.

Pins, collar section, pin cushion.

Sewing machine, thread, pin cushion, scissors, waste container, chair.

Grade seam by trimming one side of seam allowance to 1/4", the other side to 1/8". Press seam open.

Understitch seam to within one inch of ends, tie threads.

Pin baste collar ends right sides together.

Machine stitch.

Remove pins, put into pin cushion.

Trim seams, miter at corners, turn and press seam.

Turn and press collar.

I. Join Collar to Blouse:

Clip neckline seam to within 1/4" of stay stitching.

Place collar to right side of blouse, matching center back, notches and center front.

Stitch under collar to back neckline from shoulder seam to shoulder seam.

Pin baste complete collar to blouse from shoulder to center front.

Machine baste complete collar to blouse from center front to shoulder. Remove pins, put in pin cushion.

Collar section, scissors, iron, ironing board, seam board, or point press.

Collar unit, scissors, sewing machine, thread, chair, waste container, tape measure.

Pins, collar section, pin cushion.

Sewing machine, thread, collar section, scissors, waste container.

Pin cushion.

Scissors, collar, seam board, iron, ironing board, waste container.

Iron, ironing board, collar section.

Blouse unit, scissors.

Collar, blouse unit, pins, pin cushion.

Sewing machine, thread, collar, blouse.

Pins, pin cushion, blouse, and collar unit.

Sewing machine, thread, blouse and collar unit, pin cushion, scissors, waste container, chair.

Fold facing back; pin baste and stitch from fold line to shoulder line through collar, blouse and facing.

Remove pins, put in pin cushion.

Press seams open.

Trim seams from shoulder to fold line. Clip if necessary. Grade seams.

Pin baste seam. Seam under collar to blouse back from shoulder seam to shoulder seam.

Trim seam of under collar and blouse back to $1/4$ ".

Finish back neckline by turning all seam allowances into the collar and stitching from shoulder to shoulder.

Turn seam of facing under at facing and fasten by hand to shoulder seam.

J. Sleeve preparation:

Check markings, remove pattern, place pattern into envelope.

Stay stitch cap, lengthening stitch between notches.

Stay stitch lower edge.

Pin baste underarm seams.

Blouse unit, pins, pin cushion, sewing machine, thread, chair, scissors, waste container.

Pin cushion.

Ironing board, iron, point press.

Scissors, waste container, blouse unit.

Pins, pin cushion, sewing machine, thread, chair, scissors, waste container, blouse unit.

Scissors, waste container, sewing table, blouse unit.

Blouse unit, sewing machine, thread, chair, scissors, waste container.

Blouse unit, pins, needle, pin cushion, thread, thimble, scissors, sewing table, waste container.

Pattern and sleeve, pin cushion, pattern envelope.

Sleeve, sewing machine, thread, chair, scissors, waste container.

Sewing machine, thread, chair, scissors, waste container.

Pins, pin cushion, sleeve.

Machine stitch the underarm seam.

Sewing machine, thread, chair, scissors, waste container.

Press underarm seam.

Iron, sleeve board, ironing board.

Hem sleeve by machine if straight.

Sewing machine, thread, chair, scissors, waste container.

K. Joining sleeve to blouse:

Draw up sleeve cap to fit armscye and mold out fullness over pressing mitt.

Iron, ironing board, pressing mitt.

Join notches of blouse and sleeve; pin baste sleeve into the armscye.

Pins, pin cushion, chair, sewing table.

Machine baste sleeve into armscye.

Sewing machine, thread, pin cushion, scissors, waste container, chair.

Check fit.

Pin cushion.

Stitch seam, reinforce lower half of armscye seam by double row of stitching.

Sewing machine, thread, scissors, waste container.

Pink seam to 3/8" and press.

Pinking shears, waste container, iron, ironing board, sleeve board.

L. Finishing blouse:

Make buttonholes with machine attachment. Cut buttonholes.

Sewing machine, buttonhole attachment, buttons, waste container, scissors, chair, buttonhole scissors or razor blade, and block of wood or cardboard.

M. Press blouse:

Iron, ironing board, blouse.

JOINING BLOUSE AND SKIRT

Determine the exact circumference for stay tape during fitting. Place tape behind waistline marked on blouse, draw up the tape to fit, pin ends together at placket line.

Hold stay tape in place as the blouse and skirt are stitched together. Use twill tape for washable garments.

Using buttonhole stitch, apply hook and eye to ends of tape, allowing the ends of tape to come together at side seam.

Turn skirt wrong side out, and blouse right side out.

Place skirt over the blouse, right sides together.

Match at center front and back, side seams, and side front and back.

Zipper placket:

Baste stitch placket opening, press seam open.

Pin baste and stitch a strip of seam tape to the edge of the back seam allowance on the wrong side of the fabric.

Lay zipper face down on seam.

Place center of zipper chain against closed seam line.

Pins, pin cushion, chair, sewing table, mannequin or dress form.

Pins, sewing machine, thread, tape, pin cushion, chair, sewing table.

Hook, eye, thread, needle, thimble, chair, sewing table.

Chair, sewing table, parts of dress.

Chair, sewing table, parts of dress.

Pins, sewing machine, thread, chair, scissors, waste container.

Sewing machine, thread, scissors, waste container, iron, ironing board, chair.

Pins, pin cushion, sewing machine, thread, seam tape, scissors, waste container.

Zipper, dress, chair, table.

Zipper, chair, table, dress.

Stitch zipper tape to back seam allowance, using regulation stitch and regular machine foot with left edge of foot running close to right edge of zipper chain.

Sewing machine, thread, scissors, zipper tape, chair, waste container.

Fold zipper to the right with right side up, making 1/8" fold on back seam allowance bringing edge of fold next to zipper chain and stitch with zipper foot.

Sewing machine, thread, scissors, zipper foot, chair, waste container.

With zipper face down on open seam, baste stitch across zipper tape just below the zipper and up to and across zipper top, and stop.

Zipper, dress, sewing machine, thread, chair, waste container, scissors.

Turn to right side. Stitch zipper from just below the zipper and up to and across zipper top and stop.

Zipper foot, sewing machine, chair, scissors, waste container.

Remove basting stitches.

Scissors, waste container, chair, sewing table.

Press placket on wrong side.

Iron, ironing board, dress.

Final finishes:

Hem:

Try dress on individual, measure hem at proper length.

Hem marker, pins, pin cushion, table to stand on.

Turn up hem correct amount, baste turned edge, check.

Sewing machine, thread, chair, pins, pin cushion.

Trim off excess fabric to make 2" hem, depends on fullness of skirt.

Scissors, waste basket, tape measure or gauge.

Clean finish edge of hem.

Finish hem with hemming stitch.

Using buttonhole stitch, apply fasteners and snaps.

Press completed garment lightly on right side.

Sewing machine, thread, chair, scissors, waste container.

Needle, thread, thimble, scissors, chair, sewing table, pin cushion.

Snap, needle, thread, scissors, chair, table, waste container, dress.

Dress, iron, ironing board, sleeve board.

ADDITIONAL SEWING EQUIPMENT AND SUPPLIES
FOR OPTIMUM CONDITIONS AS DETERMINED BY JOB ANALYSIS

A list of adequate equipment and supplies was prepared from planning the processes involved in constructing a cotton dress. However, through making the job analysis, additional items were suggested. They are

Dress form	Buttonhole scissors
Waste container	Hinged presser foot
Armscye curve	Gauge (5-inch metal ruler with a sliding marker)
- Padded roll	Square rule
Seam board	Pressing mitt
Pin marker	Sleeve board
Mirror	Posture chair
Perforation marker	

SPACE NEEDED FOR WORK AREA
AS DETERMINED BY JOB ANALYSIS

A need for six areas developed as the tasks concerned with making a basic dress were analyzed: cutting, hand sewing, fitting, machine sewing, pressing, and storage for equipment and supplies. Space needed for the work area was arranged so as to have all the equipment and supplies easily accessible to the work area to encourage good working habits.

Principles Involved in Planning the Work Area

If clothing laboratories are separate from other homemaking facilities, they should have equipment and work surfaces to

allow all students to conduct individual sewing and clothes making projects simultaneously. With this in mind, the basic principles involved in planning surface heights and storage for the work area in the laboratory were taken into account. A study of the place where the task was performed under tentative conditions aided in planning the work area.

The unit was planned with the total sewing activity in mind. Each of the areas was planned so as to bear the proper relationship to each of the other areas. A plan for the correct arrangement of equipment was made according to principles concerning the placement of large and small equipment, work heights and measures, work sequence and energy management. The latter included principles of body mechanics and time management.

After planning a logical arrangement of the work area, factors which contribute to making the task easier were considered. According to Stallard and Hagman (9, p. 3), tasks will be easier if they are divided into the "get ready", "do the task", and "clear away". The following were suggestions for getting ready for the task:

1. Plan your order of work.
2. Collect tools and supplies at the work center. Limit number of tools to actual needs.
3. Place everything within reach.
4. Arrange everything in the order of use, if possible.
5. Group tools and supplies in a circular position within the normal work area.

6. Place tools ready to grasp to avoid rehandling.
7. Have enough clear space to work.
8. Have work area well lighted.
9. Have comfortable working heights.
10. Use tools and equipment that do the work well.
11. Keep your tools and equipment in good condition.
12. Make yourself comfortable.

Careful consideration of the above factors enabled the writer to arrange the large and small equipment into a tentative unit. Since the sewing machine served as the center of the sewing activity, it was the focal point for the arrangement. A sewing table served for cutting and hand sewing. At the left end of the sewing table, a cabinet model sewing machine was placed with its right end flush with the left end of the table. The sewing unit took the shape of an "L"; thus the plan developed.

A storage chest holding the small equipment placed to the right of the worker as she sat at the sewing machine permitted the use of such equipment direct from the storage space. This suggested the tote tray for the sewing unit.

Since pressing was necessary many times during the making of the dress, an ironing board was placed to the left of the worker. The incorporation of a lap board into the sewing unit was the result of a need for comfortable working conditions while making the job analysis.

Work Heights and Measurements

The height of the work surface should be comfortable for the work being done at each work center. This height should make it possible to stand in a relaxed position and work without stooping or raising the hand above the level of the elbow.¹ Each person must decide the height of working surface which is most comfortable. The correct working height will depend upon her height, posture, length of arms, girth, and eyesight. Personal experience is the only adequate method for determining the most comfortable heights for various tasks. The widths and heights of the tables, both sewing and cutting, were determined by the vertical and lateral reaches the worker was able to make when sitting or standing in front of them. Work surfaces should not be so wide that it causes strain to reach to the back of the surface. The heights most comfortable for the writer were found to be:

Personal Measurements

	<u>Number of inches (to nearest inch)</u>
Height of elbow when standing	40
Height of elbow when seated	27
Maximum reach for right hand	51 across, 27 upward, 30 downward when seated.

¹The Heart of the Home, American Heart Association, 44 East 23rd Street, New York 19, New York, p. 5.

Maximum reach for left hand	50 across, 26 upward, 31 downward when seated.
Normal reach for right hand	42 across, 19 upward, 27 downward when seated.
Normal reach for left hand	39 across, 20 upward, 27 downward when seated.
Normal working area right hand	73
Normal working area left hand	72
Maximum working area right hand	79 when standing.
Maximum working area left hand	79 when standing.

The preceding list of personal measurements gave a basis for planning the work heights and measurements for the unit sewing area.

SPACE NEEDED FOR STORAGE OF EQUIPMENT

Storage that gives easy room without the clutter of stacking and crowding of supplies is most convenient and time saving. To help determine the space needed for the storage of equipment used in this study, the following measurements provided a good working basis:

<u>Item of Equipment</u>	<u>Length</u>	<u>Width</u>	<u>Depth</u>	<u>Height</u>
		(in inches)		
Meter stick	48	2	1/2	
Square rule	24	14		
Pin marker		7(base)	3 1/4	20
Buttonhole attachment, including extra equipment	7	4	2 1/4	
Sewing machine attachment box, with attachments	5	3	2	
Buttonhole scissors	5	2	1/4	
Iron	7	5	5	
Funnel	3	3		3
Padded role	18	3	2	
Pressing mitt	11	7	2	
Seam board	14	5		6

<u>Item of Equipment (cont.)</u>	<u>Length</u>	<u>Width</u>	<u>Depth</u>	<u>Height</u>
Ironing board	53	14		33
Sleeve board	23	8	3	
Tracing board	26	17	1/2	
Pin cushion	3	3	1	
Distilled water jug			6	7
Plastic measuring cup			5	4

Sewing machine:

Leaf	23	16 3/8	1/2	
Cabinet	23	16 3/8	4	
Bed	15	7		
Arm	13			9 1/4
Height from floor				30
Foot guard	6	3 3/8	2	

Chair:

Height from floor				18
Width of back		16		
Height of back				19
Width of seat		18		

PLAN FOR UNIT SEWING AREA IN A CLOTHING LABORATORY

Using as a guide the tentative arrangement of the sewing area previously described, plans for the improved unit were made. With the needed equipment pre-positioned, the following principles were recognized as an aid to arriving at the correct arrangement of equipment and supplies as well as in conserving time and energy (Stallard, 9, p. 3).

1. Work from right to left (if right handed), from front to back, bottom to top or top to bottom.
2. Use circular, smooth motions.
3. Use rhythmical motions.
4. Make both hands work.
5. Combine parts of a task.
6. Sit or stand in comfortable position.

7. Work at a speed best for you.
8. Work calmly and quickly.
9. Work skillfully and accurately.
10. Keep work space in order.

A knowledge of correct body mechanics is important in conserving energy expenditure. Body mechanics are concerned with the body in motion as well as in static postures. Good body mechanics are an asset, as much to be desired for good health as for good appearance. Specialists in body mechanics emphasize that poor movements or poor static posture are major causes of fatigue; and, conversely, that fatigue is an important cause of poor use of the body. Grady lists the following basic principles of body mechanics (5, pp. 4-5):

1. The muscle best fitted for the job does the job.
2. The body segments are aligned, one directly over the other and over the base of support.
3. Weights are carried near the center of gravity of the body; momentum and rhythm aid in moving objects; and heavy weights are most easily moved by pushing them at their centers of gravity.
4. Habitual correct practices are reflected in correct reflex actions of muscles.

The worker's hand and body motions, if carefully analyzed, may help to eliminate fatigue. The following principles are suggested:²

²Planning a Sewing Center-Subject Matter, Cooperative Extension Work in Agriculture and Home Economics, Kansas State College, Manhattan, Kansas, p. 1.

1. Avoid picking up and putting down.
2. Work continuously with both hands.
3. Use smooth, circular motions, rather than short, jerky ones.
4. Move hands in opposite directions for easier balance.
5. Avoid moving tools from one hand to another; pick them up with the hand which will use them.

Suggestions which will enable the use of the correct body position for the task include:³

1. Learn to sit, stand, and walk correctly so that a minimum of energy is required by these motions themselves, as well as by the work done while the body is in these positions.
2. Allow gravity to help by letting things down into containers instead of lifting and stooping to carry them or lifting them into place.
3. Face the work being done and avoid turning away from it.
4. Sit to work whenever the job allows it.
5. Avoid needless walking about.

When standing to cut at a table, the surface should be high enough so that good posture is possible. The arm should be bent at the elbow but the worker should not reach up. When pressing, the ironing board will need to be at a similar height if the worker is standing.

For sitting at the machine, desk height or a level not higher than the elbows is preferable so that reaching up may be avoided. The same general height is best for other tasks that may be done while seated.

³Ibid., p. 1.

The chair for sewing should allow for sitting back into it so the back rest can be used for support. The height should be the measurement from the floor to the under side of the bent knee. The front of the chair should be so constructed that it does not cut off circulation and pinch nerves. Since it was desirable to turn from one part of the unit to another, it was found that an armless swivel or posture chair was satisfactory for use within the unit sewing area. Such a chair can be adjusted to provide for variations in sitting heights as well as to provide a comfortable back rest for various individuals.

Principles Governing Arrangement of Equipment

Through an application of the basic principles of body mechanics, speed was gained in making the job analysis. Also, fewer mistakes occurred. Accidents and mistakes are more likely to occur when the worker is fatigued. Mistakes take time to correct, therefore it is important to keep from being fatigued. Notation was made that there was a direct relationship between fatigue and dislike for the task.⁴

Confusion, hurry and pressure to get things done on time is one of the most frequent causes of fatigue, other than poor working conditions. This would indicate a need for planning more carefully and for better management of time.

Much time may be saved by setting up good working habits.

⁴Time Management for Homemakers. Household Finance Corporation, Chicago, 1948, p. 7.

Erwin suggests the following work habits (4, p. 305):

1. Keep bulk of work at left to avoid crowding under the arm.
2. In beginning and ending to have complete control, stitch slowly and with right hand on balance wheel and left hand on work.
3. In beginning, before lowering the presser foot, have take-up at highest point and position just the point of the needle in the fabric about 1/16 inch from edge so that the feed has something to catch into. Be sure threads are under the presser foot, either straight back or diagonally back. It helps to hold them back while starting with slippery fabrics.
4. In ending, stop machine before running off the cloth, to avoid tangling in the bobbin case, and damaging the feed or presser foot.
5. In ending, stop with needle and take-up at highest point to avoid unthreading the machine when beginning to sew...Always leave several inches of thread to prevent unthreading. Pull the work straight back with threads under the foot to avoid bending the needle. The use of the thread cutter saves motion and insures sufficient lengths to tie and begin again. At the end of stay stitch, instead, use small scissors or snippers to clip thread ends short next to fabric leaving at least two inches on needle to begin again. At ends of seams, clip to leave 1/4 - 1/2 inch dangling. Longer dangles get caught in other sewing but none at all is likely to ravel back. Tying or retracing ends of seams wastes time and may tighten or pucker the work.

A willingness to make a change from the time-honored way to a new way of doing a task often will save time and effort. The pattern of work should fit the present basic aims.

Work Area

Clothing laboratories need not follow a "standard" plan, but may be laid out to fit the individual needs and available space of each school. The design for a unit sewing area included in this report is just one way the unit might be arranged. It

was planned with the thought that the ideas may be adapted or modified for the individual school situation. An analysis of the job of making a basic dress determined the work area, its arrangement and the equipment needed. The principles involved in planning any work area were followed in designing the sewing unit.

Use of an imaginary school situation aided in the planning of the unit and the laboratory area. A four-year secondary Vocational Home Economics curriculum, on a one-teacher instructional basis in an integrated school was the situation chosen. The school was located within a town of approximately 4,500 population.

From a study of the tentative arrangement used in making the job analysis, it was evident that the unit would take the shape of an "L". However, the tentative arrangement provided for only one worker. It was decided that provision should be made for two workers to utilize the floor space more efficiently. Plate II presents a floor plan of the room including eight units, each accommodating two students.

A swivel chair was recommended for each worker to facilitate turning from one activity to another with the minimum amount of effort. A storage area at the south end of the room was designed for tote trays, closets, and miscellaneous storage.

The west wall, made up entirely of floor-to-ceiling windows curtained with glass curtains, gave as much natural lighting for the laboratory as possible. The artificial lighting consisted

of a luminous ceiling system which provided diffused lighting over the entire laboratory. Plate III describes the system.

In the northwest corner of the laboratory a fitting and study area was located. Books and magazines from the department library were made available here. On the west wall were three-way mirrors, in the extreme northwest corner, a skirt marking stand, in the south end of the fitting-study area, three lavatories for a grooming area. To the right, storage was made for supplies for the grooming area and for first-aid needs. A coat rack served as an island between the grooming and study area. This also was to be used for hanging garments while making changes during fittings. The east wall of the fitting-study area was a folding door.

A lecture and demonstration center was designed for use in class discussion and teacher-demonstration of clothing construction techniques. The storage wall housed the sewing machine or sewing unit for demonstration purposes as well as a chair. A demonstration mirror which may be stored when not in use was provided.⁵ An ironing board folded into the wall. A blackboard was placed along the west wall.

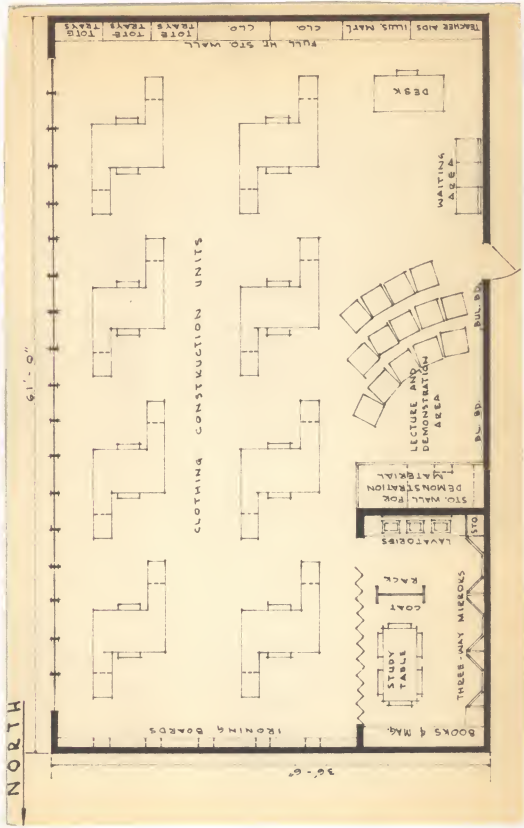
A waiting area was arranged for parents and other guests who might come to the department. The teacher's desk was in the southwest corner and back of this, on the south wall, illustrative materials and teaching aids were stored. Finally, on the north wall, five ironing boards, which fold into wall cabinets, were

⁵DEM-O-VUE Demonstration Table, Manufactured by J.A. Gordon, 1010 Stradford Avenue, Philadelphia 26, Pennsylvania.

EXPLANATION OF PLATE II

Floor plan for a clothing laboratory

PLATE II



Scale 1/8" = 1' 0"

EXPLANATION OF PLATE III

An Acusti-luminous ceiling system.

Fig. 1. Lighting with plastic diffuser.

Fig. 2. Room with ceiling system installed.

(The Acusti-luminous ceiling - the ceiling that works for you! Luminous Ceilings Inc., Chicago.)

PLATE III

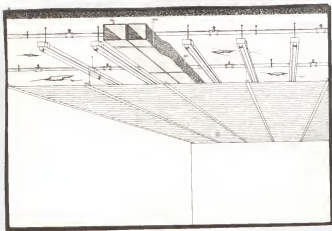


Fig. 1



Fig. 2

located. The boards are adjustable and may be rotated from right to left positions for use as desired.

An elevation of the individual sewing units is presented in Plate IV. The sewing machine as the focal point, and a table for cutting and hand work, constituted the new work area. The sewing machine was embedded in a peninsula at the left of the work area. The height of a standard cabinet model sewing machine was the basis for the height of the unit. The machine head was easily raised and lowered, operating on the same principle as a cabinet model sewing machine. When lowered, the bed on which the head of the machine sat became flush with the top of the peninsula. A leaf, covering the machine head, also covered the opening to the scrap trap. To the immediate left of the sewing machine a scrap trap was made for discarding threads and trimmings. The collection of scraps may be easily removed by a school custodian by pulling out the bin section. The bin was located below the scrap opening (Plate IV). For sewing machine attachments, a sectional trough of 3 1/2 inch depth was provided.

To the immediate right of the sewing area, a four-inch space for a tote tray, 14 inches by 18 inches, was provided for a student's individual equipment, such as scissors, needles, pins, pin cushion, tape measure, thimble, and thread. The trap may be removed to enable the student to leave space for others to use after she had finished. In the southeast corner of the laboratory three cabinets for 36 tote trays each, or a

total of 109, were placed.

Advancing to the right on the elevation, an equipment drawer was constructed for short rulers, tracing equipment and supplies, pencils, square ruler, armscye curve and miscellaneous small equipment supplied by the department. The depth of the drawer, not shown in the elevation, is twenty inches.

The last drawer on the extreme right of the unit was constructed for a lap board, tracing board, and meter stick. The depth of the drawer extends the full width of the table.

Below the drawer, storage shelves were constructed for pressing equipment. The topmost shelf was for the tallest and heaviest equipment and supplies including distilled water, iron, a seam board, hem marker and larger pressing hams. The shelves and the interior of the unit were asbestos lined. An adjustable ironing board and a sleeve board was stored at the lower left.

The elevation shows the table top raised for cutting when the worker is in the standing position. In the center of the table a supporting column was located. An electric motor, installed near the center of the table, operated an hydraulic lift for raising and lowering the table top from a thirty-six inch standing height to a thirty-inch sitting position. The device for controlling the mechanism was located under the peninsula near the machine and to the left of the worker's knee. A four-inch toe space was provided around the entire unit to enable the worker to get within comfortable working distance.

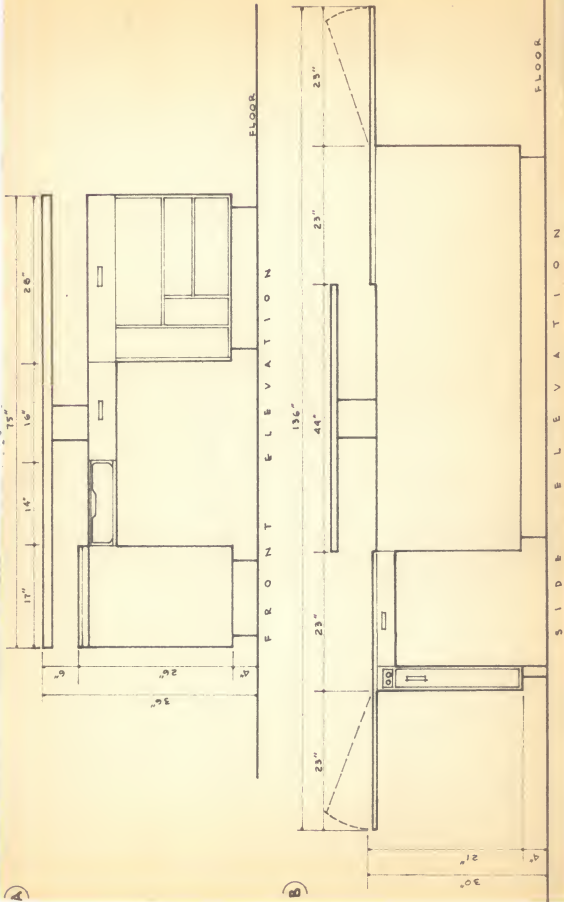
EXPLANATION OF PLATE IV

Elevation of unit work area for a clothing laboratory.

A. Front elevation.

B. Side elevation.

PLATE IV



Scale $3/4" = 1' 0"$

STORAGE OF EQUIPMENT

It is much easier to sew when all supplies are within reach. The sewing unit designed in this report offered storage facilities that were motion-and-time-savers. Sewing supplies and equipment were easily accessible to the worker but out of the way when not in use. To improve storage, the following suggestions were offered by Knowles (6, p. 11):

1. Consider size of items you want to store; in your estimate be sure to provide for things you may acquire in the future as well as your current needs.
2. Store items where they are first or most often used.
3. Duplicated supplies help.
4. Store articles you use most often in most convenient place so you do not need to stoop or stretch.
5. Adjustable shelves let you expand or contract your storage areas.
6. Use your space economically. Example: can hang twice as many suits, blouses, skirts, and jackets in the space needed for full length dresses if you provide two levels of hanging rods.
7. Sliding or folding doors for a closet may solve your storage problems. A slatted panel in the door allows ventilation in a clothes closet.
8. Can make cupboards more efficient by using sliding shelves, or tote trays, bins, files, revolving shelves, door pockets, and step-up shelves.
9. By partitioning a room with bamboo or fabric curtains on a curved traverse rod, you can make a closet.
10. Be sure storage space is adequate, is handy, provides necessary ventilation, light, temperature, and protection from dust and insects.
11. Consider flexibility and cost.

According to Agan (1, p. 394), successful storage requires adequate space as determined by the size, shape, and number of the items to be stored in due relation to the activity which each item will serve and the order in which the various processes of the activity are to be performed. Storage should be planned with due regard for each specific work center and should take into account the following rules:

1. Store materials and equipment near the place where they are to be used, preference in location being given to things used most often.
2. Store frequently used materials and equipment at proper heights, thus avoiding any unnecessary stooping and high reaching on the part of the worker.
3. Arrange articles so that each may be removed or replaced without handling another.
4. Group articles of similar nature together.
5. Label storage used by many different people.
6. Discard or give away seldom or never used articles.

Storage principles established in the previous suggestions were used in the design of the unit, the storage wall, and other storage facilities shown in this report. Shelves, just shallow enough to fit the supplies and equipment, were adjustable. The shelves rested on metal clips that fastened into holes in metal stripping so they were easily moved up and down. Drawer dividers enabled lifting out just what was needed without sorting. The storage wall was planned to fit the items to be stored and the way it was to be used. A place for everything and everything in its place best summarizes the over-all

principles followed in planning the storage facilities shown in this report.

EVALUATION OF UNIT SEWING AREA

The purpose of designing the unit sewing area was to plan so as to increase efficiency in clothing construction. To reach this objective, correct arrangement of equipment, storage, and work areas was planned. The value of an efficient unit in contrast to an inefficient one may be measured in terms of the amount of the worker's time and energy expended. While making the job analysis, the worker noted time was conserved through an orderly arrangement of equipment and supplies. Also, loss of energy was minimized when the rules governing correct working habits and body mechanics were observed. Interest was stimulated while constructing the basic dress when the plan of unit construction was followed. Planning resulted in conservation of time and energy in doing the task, obtaining the supplies and equipment, and using the tools and work space.

The appearance of the garment was improved because it could be made more quickly and with a minimum of handling. In addition, storage for hanging the partially finished garment was accessible. The best possible provisions were made for making the task easier for the worker. The worker was able to construct the dress without having to leave the unit area. It was proven that consideration given to the arrangement of equipment, storage and work area resulted in a well organized sewing area.

The unit sewing table was designed without regard to cost. However, such a table would be expensive to construct because of its unique features. The hydraulic lift alone would constitute a notable portion of the expense. The sewing machine also represents a major investment. The materials selected for constructing the unit such as the formica table top, wood and miscellaneous materials as well as the cabinet work all add to the cost. Although the cost was not the primary concern in designing the work table, practically, it cannot be ignored.

SUMMARY

The objectives of this report were to analyze the procedures necessary for the construction of a basic cotton dress; to develop a plan, based on this analysis, for the arrangement of equipment, storage, and work area in a clothing laboratory so as to increase efficiency in clothing construction; and to evaluate the results of the analysis and the arrangement of the sewing unit.

A plan was developed, based on the analysis, for the correct arrangement of equipment, adequate storage, and work area in the clothing laboratory. A tentative arrangement of the unit was first made to aid in determining the space needed. Using the tentative arrangement as a basis, and the findings from the analysis of the job of making a basic dress as a guide, the new unit was designed. Arrangement of equipment in the work area was included in the plan.

Storage based upon the space needed to accommodate the various pieces of equipment was included in the plan. A place

for everything and everything in its place best summarizes the over-all principles followed in planning the storage facilities shown in this report.

An evaluation of the job carried out in the unit indicated increased efficiency of the worker, her heightened interest in the task, and improved appearance of the garment. Careful planning and proper arrangement of equipment, storage and work area resulted in a well organized unit.

ACKNOWLEDGMENTS

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REFERENCES

- (1) Agan, Tessie.
The House its plan and use. New York: J.B. Lippincott Company, 1956. 706 p.
- (2) Bishop, Edna Bryte.
The Bishop Method of Clothing Construction. New York: Advance Pattern Company, Inc., 1955. 24 p.
- (3) Erwin, Mable D.
Practical Dress Design. New York: The Macmillan Company, 1954. 178 p.
- (4) _____
Clothing for Moderns. New York: The Macmillan Company, 1957. 632 p.
- (5) Grady, Ethyl Rathbun.
Body Mechanics in Homemaking Tasks. The College of Home Economics, University of Rhode Island, January, 1954. 24 p.
- (6) Knowles, Esther L.
"Is Your Home a Storehouse?". Vermont Farm and Home Science. June, 1956, Volume 2, Number 1. Agriculture Experiment Station, University of Vermont and State Agriculture College, Burlington, Vermont. 11 p.
- (7) Nickell, Paulena, and Jean Muir Dorsey.
Management in Family Living. London: John Wilen and Sons, 1950. 639 p.
- (8) Flanning a Sewing Center, Cooperative Extension Work in Agriculture and Home Economics, Kansas State College, Manhattan, Kansas. p. 5.
- (9) Stallard, Frances M., and Ida C. Hagman.
Make Your Work Easier. College of Agriculture and Home Economics, University of Kentucky and the U.S. Department of Agriculture cooperating. Bulletin HE-894. June 1954. 4 p.
- (10) The Heart of the Home. American Heart Association, 44 East 23rd Street, New York 19, New York. 1954. 28 p.
- (11) Time Management for Homemakers. Household Finance Corporation, Chicago, 1948. 43 p.

PLAN FOR A UNIT SEWING AREA IN A CLOTHING
LABORATORY BASED UPON JOB ANALYSIS

by

Nell Wheat Walker

B. S., Western Kentucky State College, 1955

AN ABSTRACT OF A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Clothing and Textiles

KANSAS STATE UNIVERSITY
MANHATTAN, KANSAS

1964

Approved by:

Major Professor

Interest in clothing construction is often stimulated when the worker is provided with an efficient sewing center. Correct arrangement of tools and supplies, comfortable working conditions, efficient storage facilities, and a well organized work area encourage a better job of sewing. Time and energy are conserved as a result of a well organized work area. The purpose of this report was to analyze the procedure necessary for the construction of a basic cotton dress; to develop a plan, based on this analysis, for the arrangement of equipment, storage, and work area in a clothing laboratory so as to increase efficiency in construction; and finally, to evaluate the results of the analysis of the task and the arrangement of the sewing unit.

An analysis was made of the job of constructing a basic cotton dress to determine the equipment and supplies necessary for the sewing unit, the work area needed, and the arrangement of these areas. The analysis showed the need for six areas: cutting, hand sewing, fitting, machine sewing, pressing, and storage for equipment and supplies. Arranging these areas in an "L" shape, with the sewing machine as the focal point, enabled the worker to have the proper work sequence.

The basic principles involved in planning a work area were taken into account. A study of the place where the task was performed under tentative conditions aided in developing the plans. Principles concerned with the placement of large and small equipment, work heights and measures, work sequence and energy management were applied. The writer's most comfortable

working surface heights and personal measurements served as guides in determining working surface levels and location of storage.

A swivel type adjustable chair was provided to facilitate working between a luminous lighting system and floor-to-ceiling windows provided adequate illumination for the work areas. A floor plan for the entire clothing laboratory was developed as well as elevations for the unit work table designed to accommodate two students.

An evaluation of the results of constructing the basic dress in the unit sewing area predicts an increased efficiency of the worker, a stimulated interest for the task, and an improved appearance of the garment.

The unit sewing table was designed without regard to cost and with the thought that the ideas could be adapted or modified for the school situation and to the individual needs. However, such a unit would be expensive to construct because of its many unique features.