DIRECTED-DISCOVERY VERSUS TRADITIONAL APPROACH TO TEACHING BEGINNING CLOTHING CONSTRUCTION IN THE JUNIOR HIGH SCHOOL

by

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ABSTRACT

Research indicates that mastery and transfer of cognitive content may be improved when taught by directed-discovery rather than traditional methods of teaching. Though research was abundant in fields such as social studies, mathematics and science on the use of directed-discovery, studies using directed-discovery in the field of home economics education could not be located. Since directed-discovery seemed to work well in other fields, this study was proposed to test the null hypotheses that there is no difference in mastery and transfer of specific principles of clothing construction when taught by the directed-discovery teaching method rather than the traditional teaching method.

A plan for the study was devised using the rotation group research design. Two groups of clothing construction students were taught two principles of clothing construction. Principle #1 was taught to Group A by directed-discovery and to Group B by the traditional method. Principle #2 was taught to Group A by traditional method and to Group B by directed-discovery. Pre- and posttesting were done using the same tests for both pre- and posttest. The

data was analyzed through use of two analyses of covariance, one for Principle #1 and one for Principle #2. Since statistical analysis showed a significant difference, the null hypotheses were rejected.

CHAPTER 1

INTRODUCTION

With traditional methods of teaching an objective is to "cover the material", which translated often means to teach the body of facts which serve as the foundation for that particular field of study. Having a solid foundation in a field of study is necessary in order to "do something with the information"--apply, analyze, or synthesize, for instance. Therefore, the facts or knowledge level gives the student the background he needs to see relationships or to apply a known principle in a new situation. Merely acquainting a student with factual information is not only dull for both teacher and student, but it could rob the student of an opportunity to become acquainted with the fascinating way that area of study is put together--its facts as they interrelate, its unsolved problems and its unanswered questions. Knowledge of a body of facts does not equip a student to cope with the complex problems of today's or tomorrow's society. The ability to accurately memorize dates, times, names and places is not of the same quality as is the ability to analyze a situation to see what the problem is and the use of skill and technique in seeking a possible solution.

Developments in science or technology can have far-reaching effects in all phases of living. New and unanticipated problems emerge as scientific and technological advancements take place. Ability to make decisions and solve problems intelligently may prove to be two highly valued skills in tomorrow's world of accelerating advancements. With knowledge doubling every 10 to 12 years, we can no longer afford the extravagance of learning specific solutions to each new problem. Instead, what is needed is the ability to identify, organize, and classify the elements of a situation into a structure which makes the problem clear to the student. The student may then recognize the structure or classification as being similar to one in the past in which he has applied a specific rule or principle in solving the problem (4). The student may then apply the known principle to the new problem.

Learning to apply principles seems to be an efficient way of learning, and snowballing could result if the principle learned is a major one that could be applied quite frequently. An example is use of the organizing principle of low heat for cooking protein, such as eggs, milk, and meat. A combination of discovery and problem-solving could develop into a method of attack that might be used on almost any task (6, p. 31).

One way of learning to apply principles is to have students discover useful applications of the principle, either independently or through direction from the teacher. Theoretically, the discovery method of teaching may be used as a way of mastering subject matter content and as a method of attack for problem situations. A review of literature revealed proponents for directed- and independent-discovery. Each has advantages and disadvantages for students. Additional research appeared to be needed to develop a combination of the two methods of discovery learning that would maximize the positive effects and minimize the negative effects.

Social studies, science, and mathematics teachers have published a large percentage of the research on the use of the discovery method in the public school. Some of the published results have indicated that the discovery method of teaching, when compared to traditional methods, increases motivation to learn, retention of facts, the quality of comprehension, and transfer to new situations.

The discovery method of teaching, though widely discussed in other fields, appeared virtually absent from teaching practices in the area of homemaking education in the public schools. Since this method seemed to yield positive results in other fields of study, it would also seem to offer useful application in homemaking education. In this study, directed-discovery method of teaching was used to see if similar good results in mastery of cognitive content and ability to solve problems could be obtained.

The Problem

It was the purpose of this study to compare the effectiveness of the directed-discovery method of teaching with the traditional method of teaching selected clothing construction concepts to seventh grade students at Wakefield Junior High School, Tucson, Arizona. The concepts, adapted from Kernaléguen, to be mastered and transferred were:

1. The control of dimensional stability of the fabric is related to its texture and structure and is dependent upon the manipulation of the fabric during garment construction (14, p. 9).

2. "When concentric circles or areas of different radii are used in clothing construction, adjustments in the circumference are necessary" (14, p. 9).

The study was designed to secure information relevant to the following questions:

1. Do students taught by directed-discovery achieve a higher level of mastery as measured by knowledge and

comprehension test items than those taught by traditional methods when taught the following principles:

a. The control of dimensional stability of the fabric is related to its texture and structure and is dependent upon the manipulation of the fabric during garment construction (14, p. 9).

b. "When concentric circles or areas of different radii are used in clothing construction, adjustments in the circumference are necessary" (14, p. 9).

2. Do students taught by directed-discovery transfer to a greater extent as measured by application of principle test items than those taught by traditional methods when taught the following principles:

a. The control of dimensional stability of the fabric is related to its texture and structure and is dependent upon the manipulation of the fabric during garment construction (14, p. 9).

b. "When concentric circles or areas of different radii are used in clothing construction, adjustments in the circumference are necessary" (14, p. 9).

Hypotheses

1. There was no difference in the mastery of content between the traditional method of teaching and the directed-discovery method of teaching for the following concepts:

a. The control of dimensional stability of the fabric is related to its texture and structure and is dependent upon the manipulation of the fabric during garment construction (14, p. 9).

b. "When concentric circles or areas of different radii are used in clothing construction, adjustments in the circumference are necessary" (14, p. 9).

2. There was no difference in the transfer of content between the traditional method of teaching and the directed-discovery method of teaching for the following concepts:

a. The control of dimensional stability of the fabric is related to its texture and structure and is dependent upon the manipulation of the fabric during garment construction (14, p. 9).

b. "When concentric circles or areas of different radii are used in clothing construction, adjustments in the circumference are necessary" (14, p. 9).

Assumptions

1. The teacher was competent in both methods of teaching.

2. There was no carryover of cognitive content from Principle #1 to Principle #2.

3. The tests were not testing reading ability but were testing students' mastery of cognitive content.

4. The test items were not ambiguous to students taking them.

5. The tests measured mastery and transfer.

6. The test items were comparable in difficulty and discrimination power.

Limitations

A limitation of the study was the language barrier and possibly a difference in cognitive style between the Spanish speaking students and the teacher. It was next to impossible with the present design to assess the value of either teaching method with students who didn't understand the language or possess a cognitive style that would enable them to categorize, classify and analyze.

Definitions

The following are frequently used terms in this study;

Application.--The use of abstractions in particular and concrete situations. The abstraction may be in the form of general ideas, rules of procedures, or generalized methods. The abstractions may also be technical principles, ideas and theories which must be remembered and applied (2). Transfer and application are used interchangeably.

Comprehension.--The mental process of organizing and reorganizing content to achieve a particular purpose (2).

Directed-discovery.--A teaching-learning process in which a setting is provided where educational experiences are intelligible and understandable, and the mind of the child is guided so that he sees not only the correctness of the manipulations but also the rationale of the process (12, p. 538).

Knowledge.--Learning that involves the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure or setting (2).

Level of mastery.--Behavioral level at which mastery occurs as knowledge and comprehension.

Mastery.--Sufficient grasp of the principles taught that the next higher behavioral level may be reached.

New situation.--A situation in which the student is likely to come into contact in the future which was not covered in the class work.

Principle.--A rule or law showing the relationship of two or more concepts (4).

Rotation group design.--"Reversal of the groups during the study so that the group to whom the experimental variable was applied serves as a control group while the experimental variable is applied to the other group" (10, p. 77).

Traditional.--Use of the teaching techniques usually used in teaching clothing construction, such as rote, telling, visual aids of samples of processes, and demonstration.

Transfer.--Used interchangeably with application. See application.

CHAPTER II

REVIEW OF RELATED LITERATURE

The literature on discovery learning disclosed reactions ranging from an euphoric acceptance of discovery learning for all kinds of learning to a belief that this type of learning is a complete waste of time because the same information can be given in one hour that it takes five hours to discover. However, there were authors between these two extremes who found practical applications of discovery for specific types of learning for specific ages of students.

Discovery Learning

Discovery learning is distinguished from other ways of learning in that the student is actively engaged in finding answers rather than being told. The student uses a problem-solving approach for finding answers. Bruner says that the answer has only to be new to the student, not to the world, to be discovery learning (5).

There are two distinctly different types of discovery learning described in the research, designated independent-discovery and directed-discovery. The main difference between independent- and directed-discovery is that in the independent-discovery the students plan the strategies for learning, whereas in directed-discovery the teacher plans the strategies. Students learning by independent discovery receive little or no guidance from the teacher. Spontaneity, brainstorming and concentration characterize behavior of students who discover independently working either by themselves or in groups.

Whereas independent-discovery involves the student as the planner, directed-discovery involves careful planning and structuring of the lesson by the teacher, who sets up a series of direct experiences designed to help students develop knowledge of the existence of specific factual information, relationships within the information and the implications of the information to the problem at hand. Verbal guidance is given during the lesson to avert wastage of time and energy that could occur if students were allowed to develop trivial or irrelevant material. Students work by themselves or in groups as designed by the teacher. Classroom climate in directed-discovery learning is one in which the student can become totally involved through feeling, thought and action (13). To have an atmosphere conducive to discovery learning, the teacher develops the type of classroom climate in which students feel that their ideas and suggestions are worthwhile. They feel free to offer ideas or suggestions when appropriate even though they may constitute a view different from other students' and/or that of the teacher (8).

The emphasis in directed-discovery learning is two-fold: (a) sensitizing students to seeing relationships in problematic situations through direct experiences from which implications are drawn and (b) developing a principle broad enough to have applicability in future situations. In this way skill in problem-solving is developed so that a method of attack is learned in which a principle emerges that can be applied in future situations.

Levels of Mastery and Application

Knowledge of the facts pertinent to a specific field, such as social studies, can be acquired and will be meaningful to the student if he is taught from the standpoint of problem-solving. The reason given by Cousins is that facts are not learned for the sake of knowing facts, but for the purpose of bringing knowledge to bear on a problem (8). Tinsley and Sitton say that knowledge organized around concepts is recalled easier than a lot of isolated and seemingly unrelated facts (18).

Comprehension can be developed when concepts are used as organizers of subject matter because they show the interrelationships within the subject area. In this way concepts help give meaning to content (18). Language is also a part of concept formation. When a person is able to verbalize an abstraction that he has discovered, he has reached a higher level than when he was still on the sub-verbal level (1).

Tinsley and Sitton say that the first step in concept formation is perceiving through the senses differences and similarities in objects and processes. To promote concept formation a teacher may begin by "providing numerous opportunities for students to perceive (see, touch, hear, smell and taste) various aspects, events, or circumstances" (18, p. 87).

The next step in concept formation is experience, which provides the concrete experience necessary for expansion and reorganization of concepts. The last step is reflection, which is the way the authors believe a perception progresses into conception. Tinsley and Sitton sum up by offering some ways a teacher may provide opportunities for concept formation and expansion (18).

When students comprehend the structure of a concept and are able to predict effects, determine implications or consequences they can begin to apply a principle related to this concept. Broudy says that the most serious limitation in application or problem-solving as a goal of the teacher is the lack of flexibility of what is being applied (4). To have more general applicability, perhaps, then, the teacher could strive for the attainment of broad principles to be applied. Cassel believes that transfer is the "ultimate goal of all teaching acts". He gives suggestions based on wide research to maximize transfer of learning. In summarizing his suggestions, it was found that emphasis should be on principles and generalizations that have been discovered by the students and on problem-solving of problems real to the student (7). When content is ordered so that it centers around problems, thinking is of a more reflective nature than when the content is always ordered in strict chronological order (8). Students who are made aware of the transfer value of the principles and generalizations they have discovered seem better able to apply them (7).

Advantages and Disadvantages of Directed- and Independent-Discovery

There are advantages and disadvantages to discovery learning. The main advantages seem to be:

(1) that if the student discovers for himself, then retention and transfer are improved (11).

(2) that when the student discovers a concept or principle, he understands the meaning better than if he were told the concept or principle (15).

(3) that a student is motivated to learn when allowed to learn by discovery (15).

(4) that a methodology for solving problems emerges that will enable him to solve many other problems (5).

The main disadvantage of independent-discovery learning seems to be that when allowed to learn independently with little or no guidance from the teacher, the student may not reach the objective set by the teacher. He may not learn at all (9). Proponents of directed-discovery say that refraining from giving guidance or direction is a weakness in teaching (17). A second disadvantage of independent-discovery seems to be that there may not be enough opportunity for most of the students to master a principle within an allotted time when learning independently. There seems to be much better opportunity to learn with directed-discovery than with independent-discovery.

The main advantage of independent-discovery over directed-discovery is that motivation to reach an understanding of the subject matter in some depth seems to be greater with independent-discovery than with directed-discovery even after class is over. Kersh reported a study in which 48 college students participated. Independent-discovery, directed-discovery and rote learning were compared as they related to mastering specific mathematics principles. The findings of the study showed that the directed-discovery group gained more understanding of principles than either the rote or independent-discovery groups. However, among those students who did reach an understanding of the principles by the independent-discovery method were students who were motivated to continue learning after class and who sometimes discussed the mathematics problems with other friends (15). This puts the teacher in the dilemma of deciding which is more important--reaching more students and providing for understanding or reaching fewer students but with resulting greater motivation and depth of understanding (15). In the public schools, however, education is for all the students, not only the brightest and most independent workers. Perhaps with newer research some combination of directed-discovery and independent-discovery can be made to maximize the advantages of both methods.

Studies in Homemaking Education Related to Discovery-Learning

While there were literature and research on the subject of discovery learning, much of it dealt with curriculum studies in mathematics, social studies or science. One article on discovery learning *per se* in the area of homemaking education was located. This study dealt with teaching values concepts to home economics students. The results of the study showed that those students who were taught by by discovery learned significantly more than those who were taught by other structured programs (3).

Related articles discussing the use of conceptual approach in homemaking education were located which seemed relevant because the conceptual approach is used in discovery learning. In the first related article, Tinsley and Sitton discussed the role of concepts in learning and behavior. They say that mastery of concepts is the mental attainment that takes place before generalization or the ability to see relationship between concepts takes place. If a goal of the homemaking teacher is the application of principles, then the teacher must first help students master concepts as organizers of experiences and objects (18).

In the second article Kernaleguen reported a study in which she taught clothing construction at the college level through the teaching of broad principles that could be applied to all clothing construction made from woven fabrics. She believed that education could be made more effective if basic learnings and principles were applied. With the emphasis on fundamental principles, the author found that students solved more problems themselves and worked more independently than in previous semesters.

Kernaleguen identified the following principles as being fundamental to all clothing construction:

> Shaping flat fabric to conform to body curves requires reducing the perimeter of garment pieces.
>
> Manipulation of any given material is dependent upon its component parts.
>
> When concentric curves or arcs of different radii are used in clothing construction, certain adjustments in the circumferences are necessary.
>
> Choice of construction methods and techniques and choice of fabric are interrelated (14, p. 9).

The second and third principles seemed to be especially meaningful to seventh grade beginning clothing construction students, because their inexperience in clothing construction would seem to necessitate the inclusion of the cognitive content that would come out of these two principles.

CHAPTER III

PROCEDURES

In this study directed-discovery and traditional teaching approaches were compared to see if there was a difference in the level of mastery and transfer of cognitive content between the two methods. The cognitive content to be mastered and transferred were two principles adapted from Kernaleguen:

(1) The control of dimensional stability of the fabric is related to its texture and structure and is dependent upon the manipulation of the fabric during garment construction (14).

(2) "When concentric circles or areas of different radii are used in clothing construction, adjustments in the circumference are necessary" (14, p. 9).

Population

Students in four seventh grade beginning clothing construction classes were the subjects in the study. These classes constituted the total population of students in clothing classes at Wakefield Junior High School, Tucson, Arizona in the spring semester 1969.

Experimental Design

The study lasted four weeks in which the investigator taught the following principles of clothing construction which represented the cognitive content to be mastered and transferred.

Principle #1 - The control of dimensional stability of the fabric is related to its texture and structure and is dependent upon the manipulation of the fabric during garment construction (14).

Principle #2 - "When concentric circles or areas of different radii are used in clothing construction, adjustments in the circumference are necessary" (14, p. 9).

Class Instruction

In the traditional method, the emphasis was put on the finished project. Reading, memorizing, listening to teacher tell, and watching teacher-demonstrations made up the learning experiences. Reading was to acquaint the students with basic processes of clothing construction. Students tried to remember definitions of processes (rote learning) and where they were to be used on garments. Students were told and shown in teacher-demonstrations how and why the construction processes were done. Then students performed the processes on their own projects. Short quizes were given twice to test for cognitive knowledge.

In the directed-discovery method, the emphasis was placed on discovery of principles that could be applied to the clothing construction problems with woven fabrics rather than emphasis on the way the garments would look. Class time was spent on formulation of the problem. Learning was structured in a sequence that would best afford understanding that could be applied.

The following is a summary of the learning experiences designed to master Principle #1 and Principle #2 at the comprehension level.

In order to comprehend that the crosswise and lengthwise threads in woven fabric are not stable at right angles to each other and that this characteristic of fabric calls for measures to stabalize the fabric students:

- viewed a piece of red burlap and responded to question "How is this piece of fabric made?" to see that threads are woven at right angles to each other.
- viewed transparency and overlays of fabric to see that a piece of fabric is made of a series of threads woven over and under and that the lengthwise threads and crosswise threads are at right angles to each other (see Fig. 1).

- responded to question. "Do you think the threads would always stay in the position they are now in--at right angles to each other?"
- looked at a sample of burlap on the overhead projector to see that threads can be moved out of position and back into position by pulling on the diagonal (bias) (see Fig. 2).
- formulated a definition for the bias and told how bias may be useful in working with fabric as a corrective measure to straighten threads in a piece of fabric when they are not at right angles.
- responded to questions to see that threads must be at right angles before cutting out pattern or threads in the garment will not be going up and across at right angles. With knowledge of structure of fabric students concluded that threads could possibly shift and then the garment would not fit as planned.
- worked in committees of 4 or 5, cut a small notebook paper size circular skirt out of fabric which students had pulled on the bias to make the threads not at right angles. Students washed and ironed the skirt and compared its shape with the paper pattern to see that

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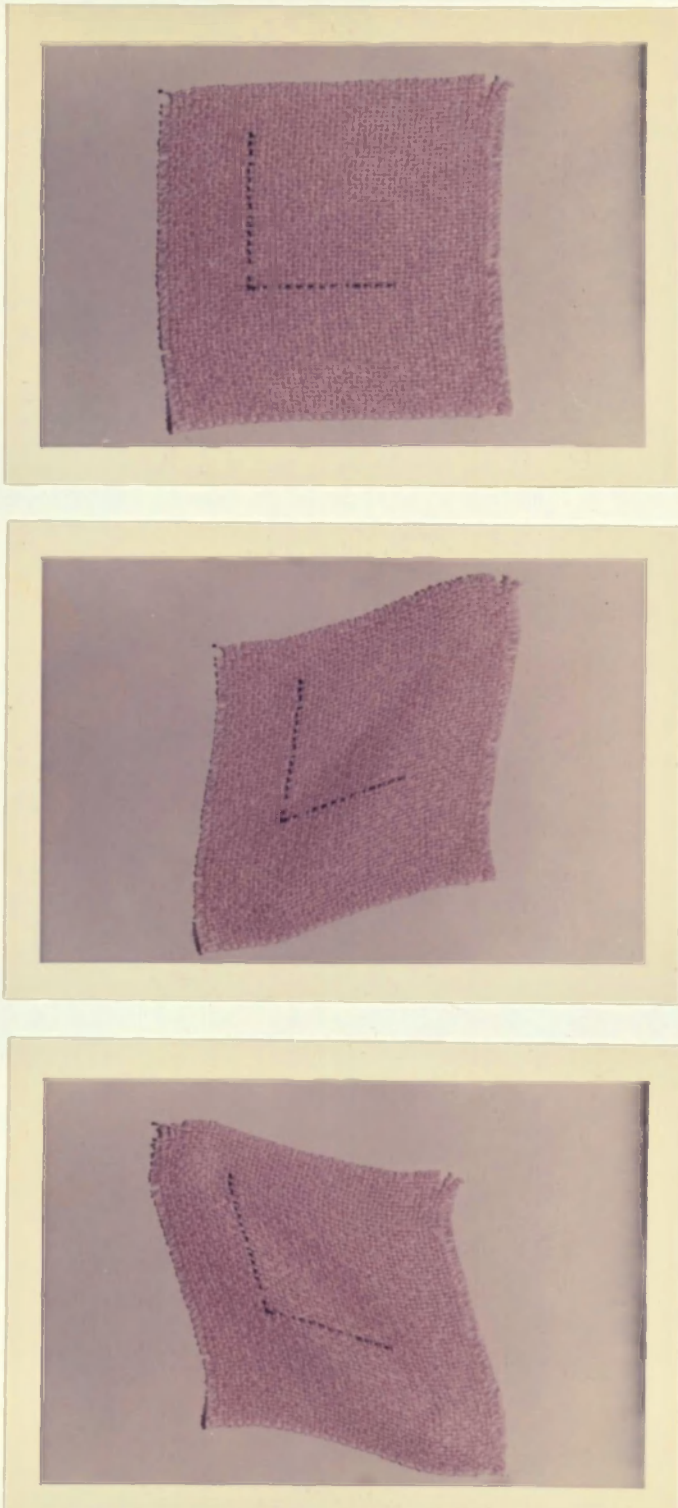


Figure 2. Crosswise and lengthwise threads at right angles to each other and pulled on the bias.

1) when the threads of fabric are not at right angles the hemline of a circular skirt will not be even and if washed and ironed the threads might shift to form right angles, making the skirt a different shape than the pattern

2) fabric cut into curves will stretch

- viewed one skirt on an overhead projector to see that stretching is when the threads have spread out in a curved or bias area such as the waistline of the skirt.
- saw how the problem of fabric stretching relates to the blouse they will be making by responding to questions "Will there be curves on the blouse? Bias?" "Could threads possibly spread out at these areas? Why?" "How will the blouse fit if the threads spread out?" (neck too large just as small skirt waist was too big)
- saw that curves are really a form of diagonals which they saw earlier would stretch easily. Students reviewed stretchability of bias.
- saw how finding a solution to prevent bias from stretching would also help to prevent curved areas from stretching.

- all agreed that they should find a solution if their blouses were to turn out pretty.

In order to find a solution to the problem of fabric stretching when cut on the bias:

- each committee was given a 6" x 8" piece of fabric cut on the bias. One half of the fabric was marked "control". Students understood that the control wasn't to be tampered with in any way, just left on the table.
- students saw teacher with the same size, color and kind of fabric also cut on the bias and watched teacher iron, "try on" and handle one half of the fabric as it would be handled if sewing on it.
- students saw that when the two pieces of fabric are put back together as they were before being cut, that the experimental piece of fabric was longer and curved slightly in the center--its shape had changed.
- students viewed both experimental and control pieces of fabric on an overhead projector to see that the threads of the experimental piece spread apart.
- students concluded that ironing, handling, and "trying on" all contributed to the stretching of

the fabric and that something should be done to the fabric before it was necessary to iron, handle or try on the blouses.

- students worked out criteria together to judge the results of the experiments they were to do with their 6" x 8" fabric samples.
  a) The solution must be such that it will keep threads from spreading out.
  b) The solution must be such that it can be used to prevent curved or bias parts of their blouses from stretching.

Each committee worked together to find a solution. They knew they could use anything in the clothing room they thought would work--brown paper, pins, sewing machine, glue, needles. A recorder was selected by the committee who wrote the details of the proposed solution and also the results as compared to the criteria. Students were encouraged to use their imagination because they might come up with a "perfect" solution that no one has ever thought of before.

Students were called together as a group to report on their proposals and results of their experiments. One committee at a time showed and told what they did to the experimental half of their fabric and how they evaluated the results (see Fig. 3). The rest of the class then

Figure 3. Reports of committees.

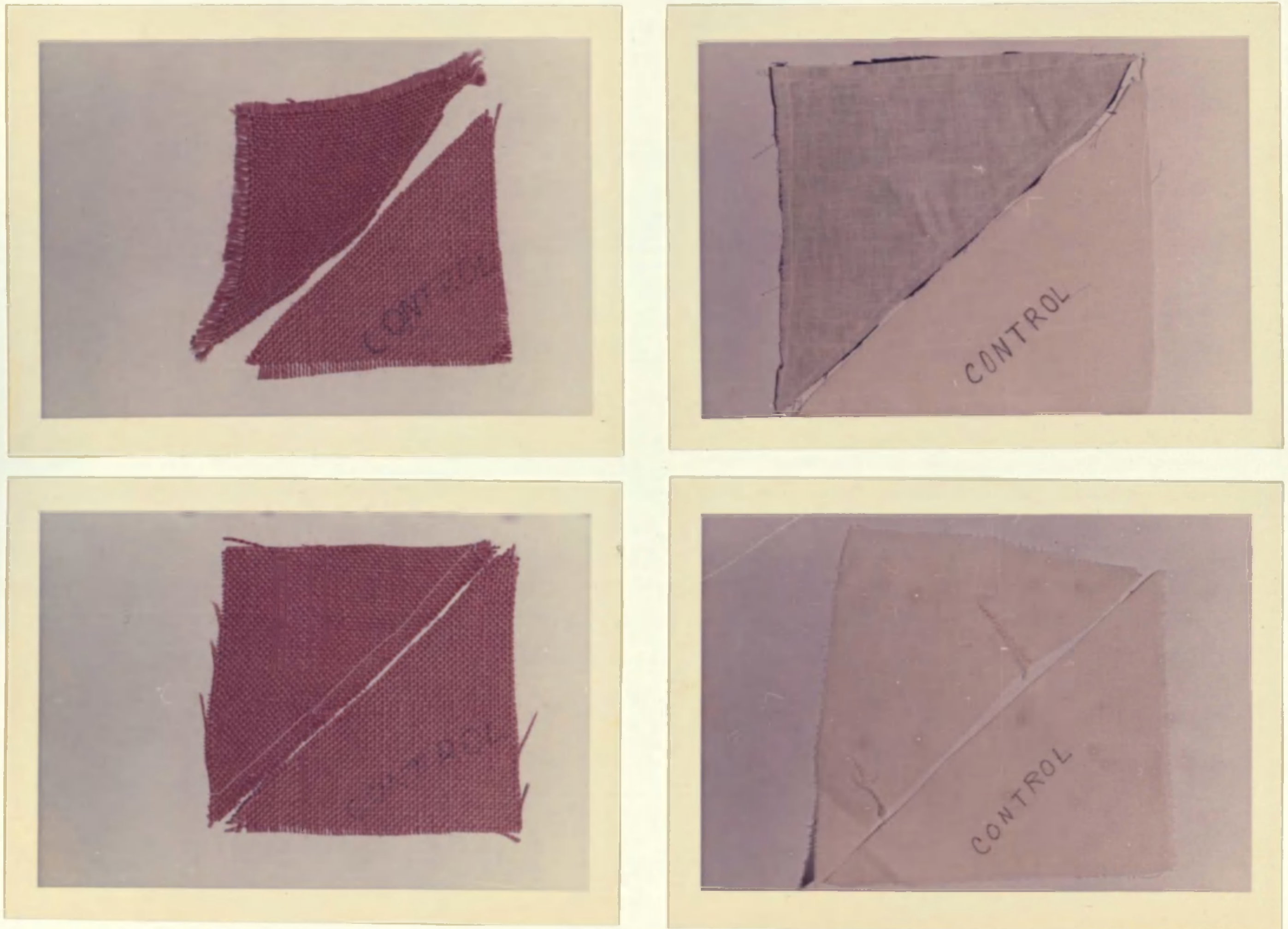
Report of Committee 1:
Problem - Keep fabric from stretching
Solution - Turn under fabric and sew it down
Results - Stretched and not same size as control

Report of Committee 2:
Problem - Edge of fabric stretches
Solution - Sew another piece of fabric under it
Results - Did not stretch

Report of Committee 3:
Problem - How to keep fabric that is cut on the bias from stretching
Solution - Try to sew 1/2 of inch
Results - It works perfectly

Report of Committee 4:
Problem - The fabric stretches on the bias
Solution - Cut out, stretch, wash, iron and fit to control, then sew it to size of control
Results - Stretches too small

These committee reports are representative of the eight committee reports actually done.



1 2

3 4

Figure 3. Reports of committees.

offered evaluative comments. After the last committee reported, students chose the one that would be the most feasible to use on the blouses. All agreed they wanted to use the method used by Committee 3 which was judged most feasible to prevent stretching. Students formulated a definition through reasoning, a summary of which is: Since this method makes the threads stay in place and it is a row of stitching, it can be called staystitching.

So that students could see that the direction in which one staystitches makes a difference as to whether the fabric will stretch or not they observed the teacher use the method called staystitching on the neck of a 1/4 size blouse front and saw that

- neck edge stretched on the right side but not on the left side
- the sewing direction could make a difference
- since the left side didn't stretch and it was sewn from the shoulder down to the center front, perhaps if the right side were sewn from the shoulder to the center front, no stretching would occur

Students observed teacher sew from the left shoulder front down to the center front and from right shoulder down to center front and concluded that the first blouse front stretched because the sewing was against or backwards from the way the threads came out of the fabric and this caused the threads to spread apart.

In order for students to see that pinning, cutting, and pressing directionally or with the grain is essential to keep the fabric from stretching and the threads at right angles they responded to questions:

"If sewing in the wrong direction makes threads move, is it possible that other methods or processes we do to the fabric could also make them move?" "What other methods or processes will you be doing to the fabric when you are making your blouses?"

Students again formed their committees to determine if cutting, pinning and pressing could make fabric stretch. Committee members experimented with pinning burlap fabric samples and saw on the overhead projector that

- threads in samples that were pinned against the grain spread apart or stretched
- threads in samples that were pinned with the grain stayed in place

Students concluded that to keep the threads of the fabric from spreading apart the pins should be placed with the grain or in the same direction as the threads. Students formulated a definition through reasoning for directional pinning.

Students went through essentially the same learning experiences for cutting, then pressing, formulating a name and then a definition for directional cutting and directional pressing. Through guided discussion students saw how directional sewing, pinning, pressing and cutting were related in that they are all ways to prevent the fabric from stretching.

Each student cut out, staystitched, made darts and sewed the shoulders of their blouse together. During class discussions, occasional casual references were made by the teacher to the neck being a curved seam and that it would be interesting to see a curved seam since no one had sewn a curved seam yet.

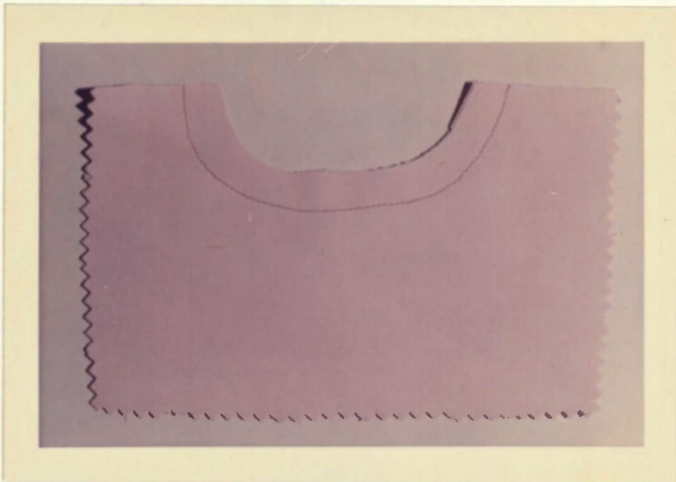
The following is a summary of the learning experiences for Principle #2:

When a few in the class were ready for the neck facing on their blouses, committees were formed and samples of curved seams were passed out to the committees. One student in each committee sewed the curved seam. The committees then came back together as one group. Looking at all the samples turned to the right side students concluded that:

--curved seams make fabric wrinkled (Fig. 4)

--a solution should be found so that the necks of their blouses would be smooth rather than wrinkled

Curved seam before turning



Curved seam after turning

Figure 4. Curved seams wrinkle fabric.

The class looked at one sample held by the teacher to see that:

- the seam was very taut
- perhaps something about the seam was causing the wrinkling

The committees met, proposed a solution, carried out the experiment and evaluated the results as to whether or not it prevented wrinkling. The recorder in each committee planned how it was done and the results. All the committee met together as a class to report their experiment and findings.

- Committee 1. Cut the seam allowance to within 1/16 inch of the seam. This was judged unusable even though this method did prevent wrinkling. Many class members thought the seam would be too weak.
- Committee 2. Try to iron the wrinkles out. This method was judged ineffective because the wrinkles were pressed in.
- Committee 3. Sewed 1/4 inch from neck edge on the right side. This method was judged ineffective because the wrinkles were sewn in.
- Committee 4. Made clips half way through seam allowance approximately one inch apart. This

method was judged partially effective because it reduced the wrinkling somewhat.

- Committee 5. Sewed the bottom edge of the sample by hand. This method was judged ineffective because the wrinkles were still there.

The class then looked at Committee 4 sample again to see that:

- the clips were evidently what made this method partially successful
- perhaps more or less of what was done would make this method wholly successful
- the distance between clips was one consideration--should it be more or less?
- the depth of cut into the seam allowance was a second consideration--should it be more or less?

The committee tried more clips at closer intervals on one side of the sample and clipping deeper into the seam allowance on the other side of the sample to see that both clipping at closer intervals and deeper into the seamline helped eliminate the wrinkling, therefore a combination of these two methods should work.

The class viewed a transparent facing sewn on medium weight cotton fabric then clipped as Committee 4 demonstrated to see that:

- the clips spread apart when the sample was turned right side out (see Fig. 5)
- the cause of the wrinkling was that the curve was smaller than the curve it was to turn back on

During discussion, the class decided they should see how all the clipping would affect the fabric if it were washed. The results of the washing were evaluated after the next learning sequence. To see that trimming reduces bulk the class viewed a sample "blouse" of heavy wool fabric with facings sewn on and clipped. Students saw that seams can be very bulky and make a neckline unattractive. Students brainstormed:

- clip more often
- make notches in seam allowance
- press it flat
- trim off part of seam allowance

One student tried one method at a time using 1/4 of the "blouse" neck for each method. Then the sample was passed around so students could evaluate the results. They concluded that:

- clipping more often did not eliminate the bulk
- notches eliminated some of the bulk
- pressing did not eliminate the bulk

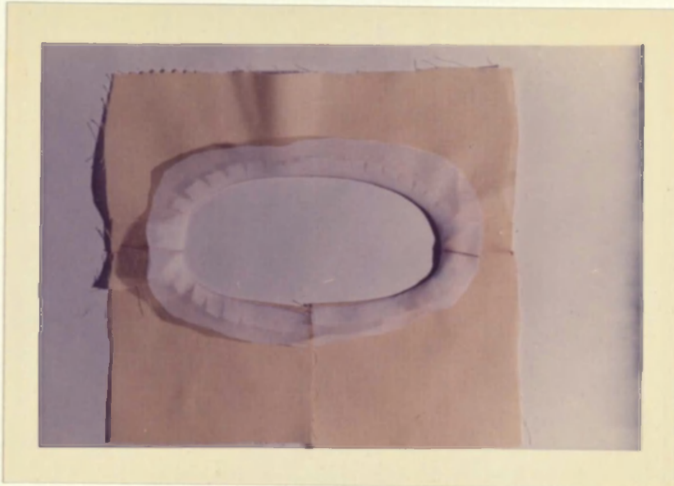


Figure 5. Clipping a curved seam.

Figure 6. Raw curved edge of facing.

— trimming off part of the seam allowance did eliminate the bulk appreciably and helped make the neck attractive

To see that a clean finished edge prevents fraying that may occur when a fabric is washed or worn students viewed the sample with the transparent facing that was washed to see that:

— the curved edge of the facing frayed (see Fig. 6)

— something should be done to the curved edge before washing or wearing to prevent the fraying

Students worked in committees as before to come up with a solution the class could use. Through experimenting they saw:

— pinking the edge prevents fraying in fabrics which don't fray easy

— sewing 1/4 inch from the edge still allows some fraying to occur

— turning up the edge of the fabric 1/4 inch and sewing prevents fraying from occurring

Students decided to use the method of turning up the edge of the fabric 1/4 inch. One committee member from the committee who proposed this method as a solution volunteered to demonstrate for the class. The class decided that turning up fabric on a curve was difficult even for a good sewer. Perhaps something could be done to help the situation. To see that bridgestitching helps to turn up curved edges students brainstormed:

- perhaps if a guide were used to turn up the edge of the fabric would be easier to turn up evenly
- the guide would need to be a little stiffer than the fabric--such as thread?
- a row of thread glued onto the edge of the fabric?
- how about sewing around the edge--this would make a row of thread and then wouldn't have to use glue on the nice blouse fabric

To see that understitching prevents a facing from rolling forward students viewed a "blouse" with contrasting color facing to see that

- blouse neck looked unattractive when facing rolls forward or "peeks out"
- something should be done to prevent facing from "peeking out"

Students brainstormed to find out what the problem was.

- the "blouse" needs pressing
- if pressed the neck seam would lie down instead of up

A student pressed the "blouse" and students concluded that

- the facing lies hidden while it is on the ironing board but starts to "peek out" when taken off

- since pressing seemed to hold the neck seam down flat perhaps something more permanent than pressing could be used to hold down the neck seam

Students brainstormed

- sew it down all the way around by hand
- tack it down just at the seams
- sew it down 1/4 inch from neck edge

The committees chose one of the above methods to try out to see if one of them would work. Each committee presented the method they had experimented with. Students reasoned and concluded that

- the small hand stitches show when sewing down all the way around and facing does "peek out" a little bit
- the facing still "peeks out" when facing is tacked at the seams
- sewing facing and neck 1/4 inch from neck edge does prevent "peeking out" but the row of stitching does not look attractive.

An analysis was made of why the third method prevented "peeking out" which was the goal of the experiment. Students concluded that

- the row of stitching holds the seam down permanently--but only the seam needs to be held down

- not the "blouse" front
- a row of stitching attaching the seam allowance to the facing would not show on the right side and would also hold the seam allowance down flat

A student largely responsible for the reasoning toward the solution demonstrated for the class. The class saw that this method did work. The class then named and defined understitching. For a comparison of the way traditional and directed-discovery were used in teaching see Appendix C.

Data Collection

Data were collected through the use of two teacher-made achievement tests which were used as both pre and post tests. Test #1 covered Principle #1. Test #2 covered Principle #2. The tests included three levels of cognition, knowledge, comprehension, and application. To reject the null hypotheses the results of the posttesting would be that Group A would test higher on Principle #1 and lower on Principle #2 than Group B, and that Group B would test lower on Principle #1 and higher on Principle #2 than Group A.

Data Analysis

Two analyses of covariance, using Educational Statistics by Popham as the reference, were computed (16). One analysis was done for each principle taught.

An analysis of covariance is in essence a combination of analysis of variance and regression prediction concepts used together to remove the effect of a known variable or variables that could bias the outcome of the study. Analysis of covariance first determines the direction and magnitude of the relationship between the independent or control variables and the dependent variables. Then using the regression prediction technique the dependent variable scores are statistically adjusted so that the scores compensate for whatever control variable disparity exists between the independent variable groups (16).

Variables.--There were two independent or controlled variables that were considered relevant in the study. One independent variable was the grade point averages of the student in academic subjects the previous semester. The other independent variable was the teaching method used, either traditional or directed-discovery. The dependent variable in the study was mastery and transfer of selected cognitive content.

Rejection of Null Hypotheses.--To reject the null hypotheses students should have mastered a greater amount of cognitive content and transferred the knowledge to new situations more frequently when taught by the directed-discovery rather than the traditional approach. Tangible results that would indicate rejection of the null hypotheses would be that students:

1. tested higher than those taught by the traditional method when tested for attainment of knowledge and comprehension of cognitive content.
2. tested higher than those taught by traditional method when tested for transfer to new situations.

CHAPTER IV

PRESENTATION OF DATA

The findings of this study were obtained from two analyses of covariance. Directed-discovery and traditional teaching methods were compared to see if students could master and transfer specific cognitive content more often when taught by directed-discovery than when taught by the traditional method.

Population

Students in four seventh grade beginning clothing construction classes were the subjects in the study. These classes constituted the total population of students in clothing classes during the spring semester 1969 at Wakefield Junior High School, Tucson, Arizona. Approximately 55% of the population had Spanish surnames. All the students were girls whose ages ranged from 12 to 16. The academic ability of the students ranged from those in National Junior Honor Society to a few enrolled in Special Education at Wakefield. The socioeconomic backgrounds of the students varied. Some were children of business and professional people while others were from second and third generation welfare recipients. Because the membership in each seventh grade clothing class was under 30, the classes were combined to form two groups, designated Group A and Group B. Group A had higher mean grade point average than Group B.

Findings

Basic data of the study is presented in Tables 1 and 2. The means of the grade point averages, pre and post tests are shown under the teaching method used for both Principles 1 and 2. Table 1 presents data for Principle #1 for both traditional and directed-discovery teaching methods. Table 2 presents data for Principle #2 for both traditional and directed-discovery teaching methods.

Analysis

The statistical analysis is presented in Tables 3 and 4. The findings of this study did exceed the .05 level of significance for both Principle #1 and Principle #2, therefore, the null hypotheses could be rejected. Although both groups mastered and transferred more content when taught by directed-discovery rather than traditional methods, Group B mastered and transferred more content when taught Principle #2 by directed-discovery than did Group A when taught Principle #1 by directed-discovery. Under the conditions of the study, the directed-discovery teaching method appears to be more effective in the

Table 1. Means of the criterion and control variables for two experimental groups--Principle #1.

Teaching Method	n	Mean of Posttest	Mean of Pretest	Mean of Grade Point Averages
Directed-discovery Group A	27	17.93	10.33	2.80
Traditional Group B	25	15.20	9.72	2.69

Table 2. Means of the criterion and control variables for two experimental groups--Principle #2.

Teaching Method	n	Mean of Posttest	Mean of Pretest	Mean of Grade Point Averages
Directed-discovery Group B	25	32.8	11.96	2.69
Traditional Group A	27	24.78	12.11	2.80

Table 3. Analysis of covariance for achievement differences between two experimental clothing construction groups taught Principle #1 by two different methods.

Source of Variation	Degrees of Freedom	Residuals: Sum of Squares	Residuals: Mean Square	F
Between	1	287.92	287.92	4.16*
Within	48	332.90	69.35	
Total	49	620.82		

*Significant beyond the 0.05 level.

Table 4. Analysis of covariance for achievement differences between two experimental clothing construction groups taught Principle #2 by two different methods.

Source of Variation	Degrees of Freedom	Residuals: Sum of Squares	Residuals: Mean Square	F
Between	1	29051.3	29051.3	368.7*
Within	48	3782.9	78.8	
Total	49	32834.2		

*Significant beyond the 0.05 level.

mastery and transfer of specific principles of clothing construction.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Research indicates that when students learn by the directed-discovery method they are better able to master and transfer cognitive content than when taught by traditional methods. This study was proposed to test the null hypotheses that there is no difference in mastery and transfer of two principles of clothing construction when taught by the directed-discovery method rather than the traditional method of teaching.

Conclusions

Since statistical analysis showed a significant difference in mastery and transfer of specific cognitive content in the groups taught by directed-discovery, it appears that directed-discovery is a more effective teaching method than the traditional approach when mastery and transfer are goals of the teacher.

Both Groups A and B tested significantly higher on the posttests when taught by directed-discovery rather than traditional teaching methods. Principle #1 was mastered and transferred more often by Group A, taught by directed-discovery, than Group B, taught Principle #1 by traditional methods. Principle #2 was mastered and transferred more often by Group B, taught by directed-discovery, than Group A taught Principle #2 by traditional methods.

Research done with culturally deprived or bilingual students show that two factors may have had an effect on the results of the study. Kersh, in his study with college students, reported that motivation was a primary reason for the success of students in mastering mathematics concepts. Among those students who did master the concepts were those who continued discussions of the mathematics problem after class was over (15). Perhaps less able students felt more motivated by directed-discovery to learn whereas more able students may not have felt so motivated. More able academic students may have received their higher grades from giving back knowledge level content to the teacher on tests and may have never developed skills that would enable them to apply what they had learned.

A second factor which may have had an effect on results of the study was the use of visuals. As a part of directed-discovery more visuals were used with that teaching method than with the traditional teaching method. Tinsley and Sitton believe that visuals help provide concrete learning experiences which may improve comprehension

(18). It would also seem that concrete learning experiences would help cross the language barrier that telling or lecturing to a class may not cross.

Recommendations for Future Studies

Since findings of the study were significant, further study might be conducted to discover what there was about the study that made the findings significant. The following is a list of suggestions for future studies:

1. Since the design of the study did not lend itself to the study of the effect of motivation or concrete learning experiences on mastery and transfer, it is felt that in future studies these factors could be studied individually as they relate to level of mastery.

2. Whereas it is common knowledge that students forget most of what is learned by memorization, the investigator felt that the mastery and transfer of principles of clothing construction would be longlasting--perhaps never forgotten by students who applied the information frequently. Testing over a longer period of time might be conducted to help establish whether specific cognitive content learned by discovery is remembered longer than that learned by rote.

3. In designing the learning experiences, the investigator had no guide as to what constituted directed-discovery

versus independent-discovery. Believing that motivation was a primary factor in the success of independent-discovery and that motivation may come from a desire to express themselves as individuals in creative endeavors, the investigator attempted to give just enough guidance that students stayed on the track, but not so much guidance as to stiffle enthusiasm. Further research would seem to be needed to investigate what there was about independent-discovery that was so motivating--freedom, opportunity to express oneself, desire to be creative? Research might also be conducted to find a combination of directed- and independent-discovery that would maximize the positive effects and minimize the negative effects of these two kinds of discovery learning.

4. Students seemed to enjoy finding solutions to the problems, especially when they were encouraged to be original. Students never asked "Why don't you just tell us the answer?", which was expected since all the students knew the author sewed frequently as a hobby. Oftentimes the author showed surprise or wonder to keep up the enthusiastic and creative atmosphere of the class. Students seemed to enjoy the reactions of the teacher and seemed to appreciate the freeness and experimental nature of discovery learning--the brainstorming, the spontaneity. The atmosphere that "no one can fail, we're all working to find a solution" seemed to catch on the first day.

Research could be conducted to investigate the possibility of the effects of the personality and/or cognitive style of the teacher as it relates to success and cognitive style of the students learning by directed-discovery.

5. Since the study was conducted in the area of clothing construction, further research on discovery-learning might be done in another area of home economics, perhaps an area without an emphasis on psychomotor skill such as child development or consumer education.

APPENDIX A

TEST #1 IN CLOTHING CONSTRUCTION

Directions:

Choose the best answer to each question. Indicate your choice by filling in the appropriate circle on the answer sheet.

Key

a 1. Staystitching is a
   a. method used to prevent fabric cut on the bias from stretching
   b. way of hemming a blouse to make the hem stay in better
   c. special way of stitching that will stay in the fabric longer than other ways of stitching

b 2. Staystitching is done by sewing
   a. 5/8 inch from the edge of the fabric with machine stitch regulator on 12
   b. 4/8 inch from the edge of the fabric with machine stitch regulator on 12
   c. 4/8 inch from the edge of the fabric with machine stitch regulator on 6

b 3. The bias is
   a. lengthwise of the fabric
   b. diagonally across the fabric
   c. crosswise of the fabric

c 4. The bias is useful to clothing construction students because they can use it to
   a. strengthen the lengthwise grain
   b. selvage the crosswise grain
   c. straighten the grainline

a 5. To straighten the grainline of a piece of fabric, pull
   a. the fabric on the bias
   b. a thread across the raw edge
   c. the selvage onto the grainline

a 6. In straightening the grainline, one is really straightening
- a. a number of threads
- b. an imaginary line clothing construction students call the grainline
- c. the frayed edges of the fabric

c 7. A grainline is straight when the
- a. bias and selvage are together
- b. threads are straight
- c. lengthwise and crosswise threads in the fabric are at right angles to each other

c 8. Which of the pieces of fabric has a straight grainline? (photograph of answers for this question is on page 57)

a 9. Choose the best reason for your answer to the above question.
- a. The threads are at right angles to each other.
- b. The bias is very strong.
- c. The sides of the fabric are straight.

b 10. If a person made a skirt out of a piece of fabric in which the grainline were crooked it would
- a. look the same as if the grainline were straight
- b. probably not feel comfortable on the person and the hemline probably would not be straight
- c. make the pockets on the skirt look crooked

a 11. Directional stitching is done so that the
- a. fabric won't stretch
- b. direction in which it was sewn will show clearly
- c. stitching will always be sewn in the right direction

b 12. Which small blouse shows an example of directional stitching? (photograph of answers for this question is on page 58)

b 13. Directional pinning is pinning
- a. in the same direction as the other students
- b. so that the threads in the fabric won't spread apart
- c. in the way the direction sheet in the pattern shows you

a 14. Which small blouse shows an example of directional pinning? (photograph of answers for this question is on page 58)

a 15. Directional cutting is done
a. by cutting in the same direction as the threads in the raw edge of the fabric lie
b. in the way the direction sheet in the pattern shows
c. by giving directions to another student while she's cutting

a 16. Which small blouse shows an example of directional cutting? (photograph of answers for this question is on page 58)

b 17. Directional pressing is
a. ironing back and forth in the same direction to get the wrinkles out
b. moving the iron in the same direction as the threads go
c. moving the iron from one side of the fabric to the other side

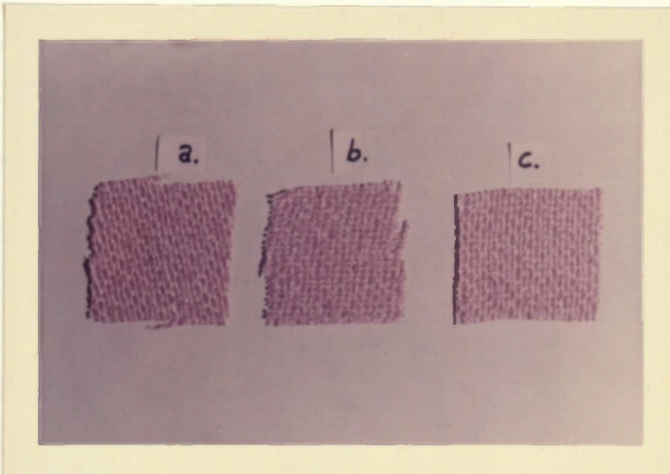
b 18. Which small blouse shows an example of directional pressing? (photograph of answers for this question is on page 58)

c 19. Directional sewing, pinning, cutting, pressing are all ways of
a. following the directions the pattern gives
b. learning how to give other students directions
c. keeping the threads in fabric from moving

a 20. To keep the grainline straight in the small skirt fronts, which way should the waist of the skirt be sewn? (photograph of answers for this question is on page 59)

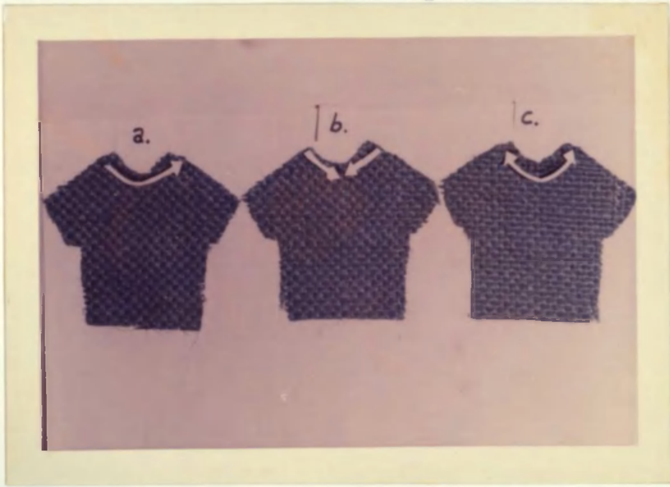
a 21. Choose the small skirt front that is pinned in the way you should pin to keep the grainline straight. (photograph of answers for this question is on page 59)

c 22. Choose the small skirt front that has the iron placed in the position that you should place it in pressing the skirt to keep the grainline straight. (photograph of answers for this question is on page 59) a 23. Which skirt front shows the direction to cut if the grainline is to be kept straight? (photograph of answers for this question is on page 59)

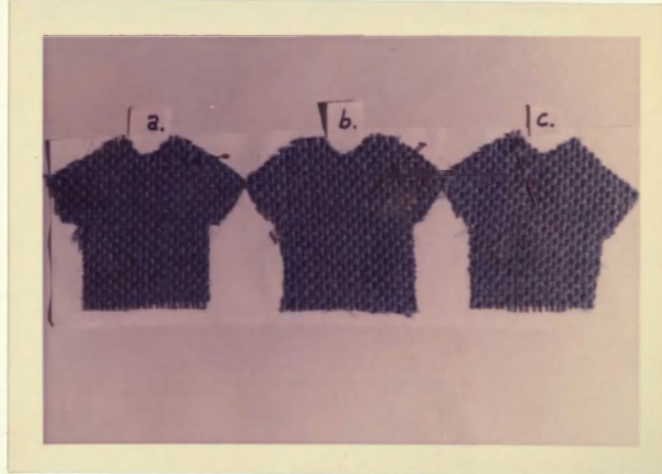


Possible answers to question 8.

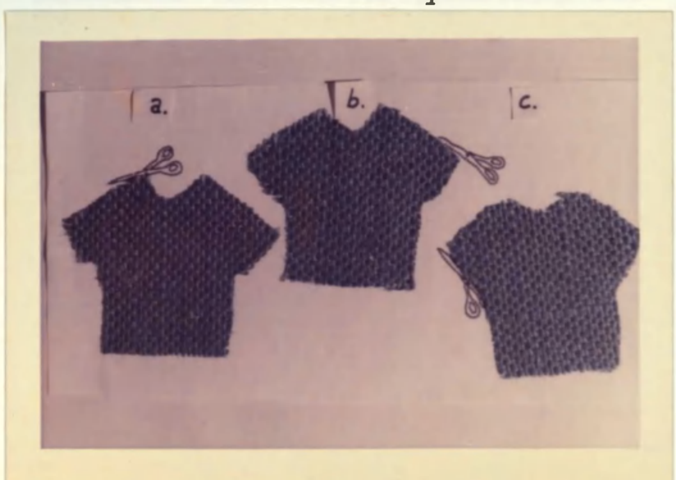
Possible answers to question 12.



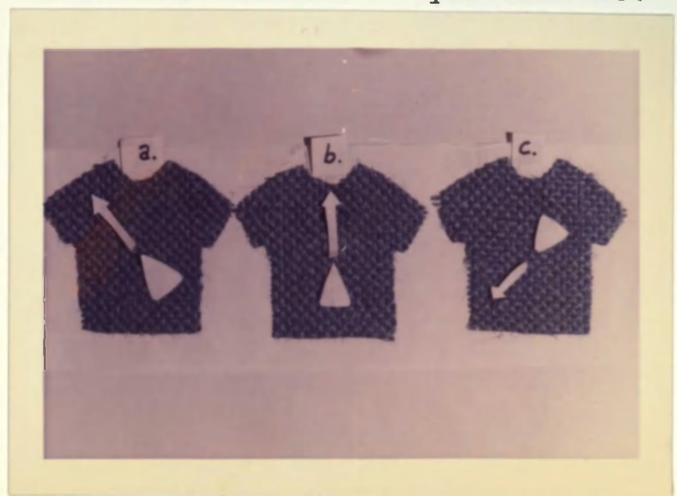
Possible answers to question 14.



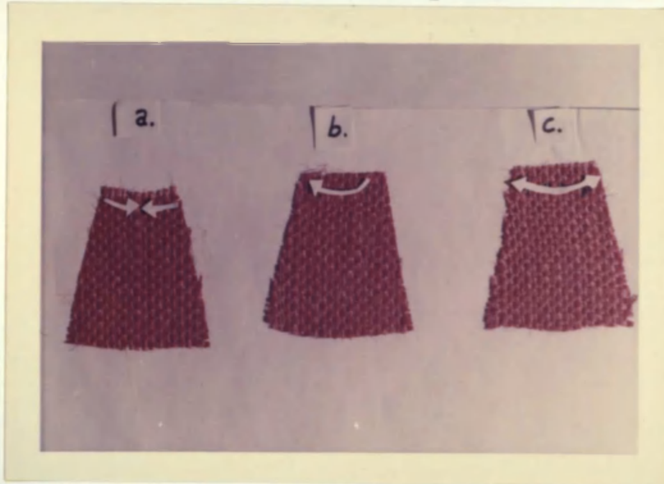
Possible answers to question 16.



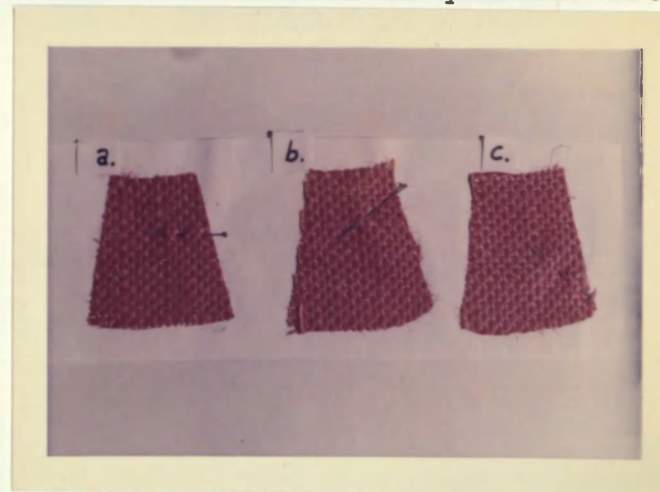
Possible answers to question 18.



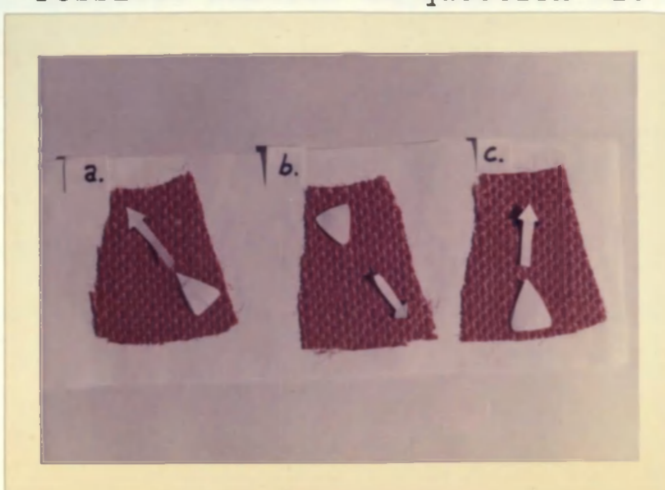
Possible answers to question 20.



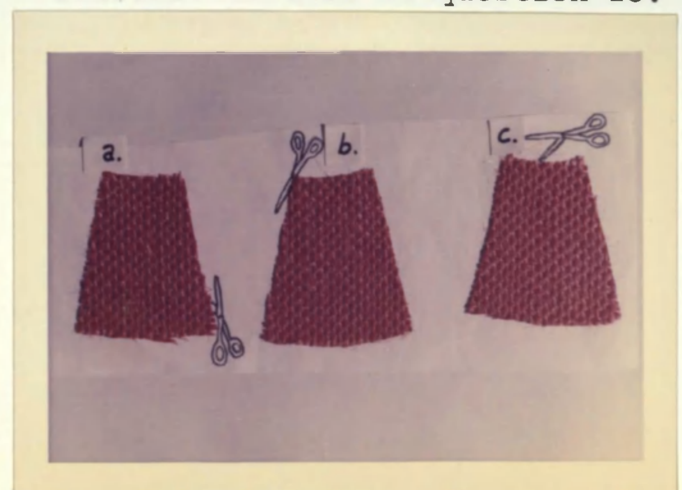
Possible answers to question 21.



Possible answers to question 22.



Possible answers to question 23.



APPENDIX B

TEST #2 IN CLOTHING CONSTRUCTION

Directions:

Choose the best answer to each question. Indicate your choice by filling in the appropriate circle on the answer sheet.

Key

b 1. A facing is worn
   a. on the outside of a blouse
   b. on the inside of a blouse
   c. either inside or outside of a blouse

a 2. A facing
   a. gives a finished appearance to the neck of a dress
   b. makes the neck of a dress look wrinkled
   c. causes the neck of a dress to fit tightly and feel uncomfortable

a 3. A facing is sewn
   a. to the outside of a dress
   b. to the inside of a dress
   c. either inside or outside depending on how it will be worn

b 4. To attach a facing to the neck of a blouse sew
   a. 1/4 inch from raw edge of both facing and blouse
   b. 5/8 inch from raw edge of both facing and blouse
   c. 4/8 inch from raw edge of both facing and blouse

b 5. Bridgestitching is sewing
   a. 4/8 inch from the raw edge of a facing
   b. 1/4 inch from the raw edge of a facing
   c. 5/8 inch from the raw edge of a facing

a 6. Bridgestitching is useful to clothing construction students because it
a. makes the edge of fabric turn up easier and more evenly
b. makes a bridge between the good and bad stitching
c. carries the thread across the fabric in much the same way as a bridge

c 7. Clean finishing is
a. a process the drycleaner uses to prevent raveling of threads on your fabric
b. the same as putting starch on the fabric to make it look nice and keep it from stretching
c. turning up the edge of fabric 1/4 inch once and sewing it

a 8. Cleanfinishing is useful to clothing students because it
a. prevents a raw edge from raveling when being washed
b. makes the fabric look clean and smooth
c. gives the student more experience in sewing

a 9. Trimming the seam allowance is
a. cutting off part of the seam allowance
b. cutting down on the seam allowance of the pattern
c. altering the pattern to the right size

a 10. Trimming is done so that the seam allowance
a. on fabric won't be so thick and bulky
b. of the pattern won't be so wide
c. on the blouse will be more the size for 7th graders to wear

b 11. Clipping is
a. making tiny notches on the edge of the fabric
b. making tiny cuts in the seam allowance
c. cutting off part of the seam allowance

a 12. Clipping is done so that
a. the curved seam allowance will spread out and lie flat
b. the parts of the pattern can be fitted together through the use of matching notches
c. the student can see how close he can cut to the seam line without cutting through it

c 13. Understitching is
a. sewing the hem so it will be under the blouse and not show
b. all sewing that is inside the blouse and doesn't show on the outside
c. sewing 1/8 inch from seam line of facing through both facing and blouse seam allowances

a 14. Understitching is done so that
a. the facing won't show on the right side of the blouse
b. the stitches in the hem will be small and not show
c. the parts of the blouse that are supposed to be inside, such as the darts, won't show on the outside

Key

Directions:

Look at samples 1, 2, 3, 4, and 5 on bulletin board, then write your answers on your own paper.*

15. Which sample(s) shows bridgestitching? 1, 2, 3, 4, 5

16. What would happen if this sample(s) were not bridge-stitched? Curved edge would be difficult to turn up.

17. Which sample(s) shows cleanfinishing? 2, 3, 4, 5

18. What would happen if this sample(s) were not clean-finished? raw edge of facing would fray when washed

19. Which sample(s) shows trimming? 3, 4, 5

20. What would happen if this sample(s) were not trimmed? seam would be bulky

21. Which sample(s) shows clipping? 4, 5

22. What would happen if the sample(s) were not clipped? facing would not lie flat, neck of blouse would be wrinkled

23. Which sample(s) shows understitching? 5

24. What would happen if this sample(s) were not under-stitched? facing would show or "peek out"

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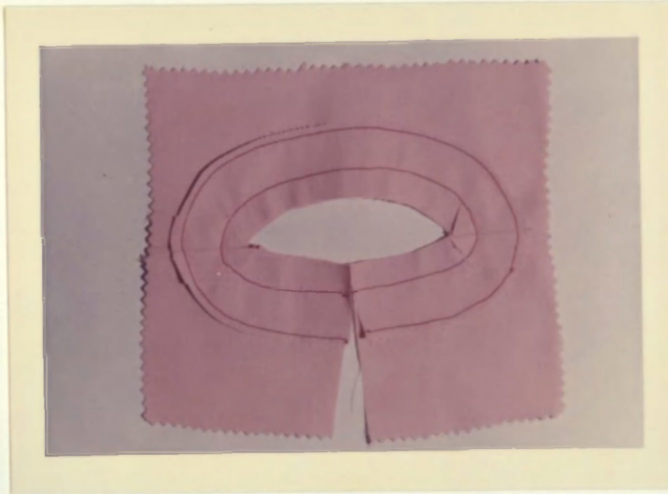
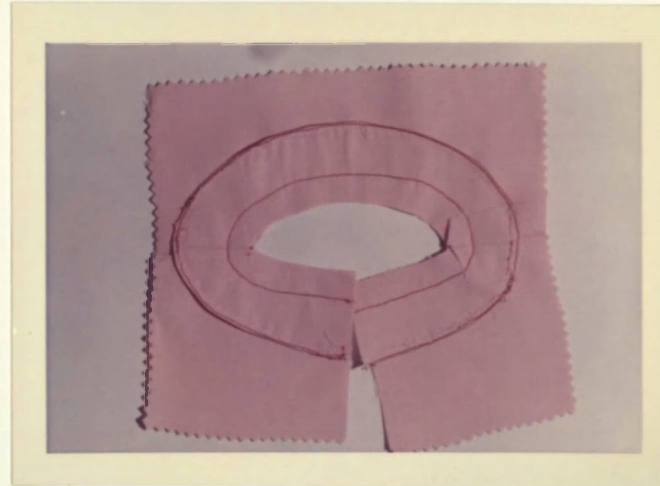
*Samples 1, 2, 3, 4 and 5 were each approximately 18" x 18". Photographs of samples are on pages 64-65.

Samples for questions 15-24.

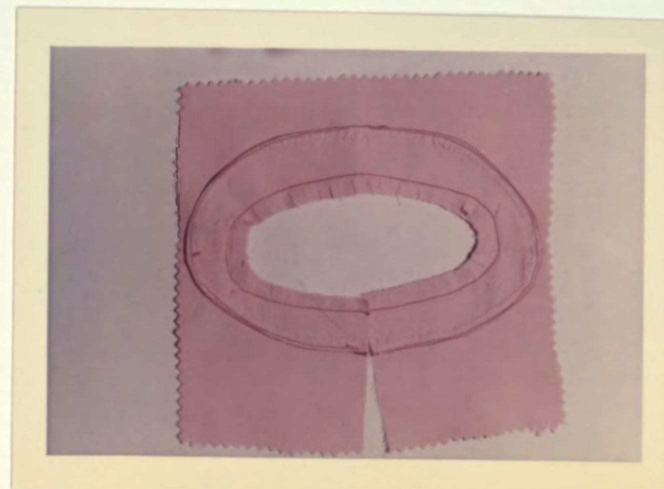
1





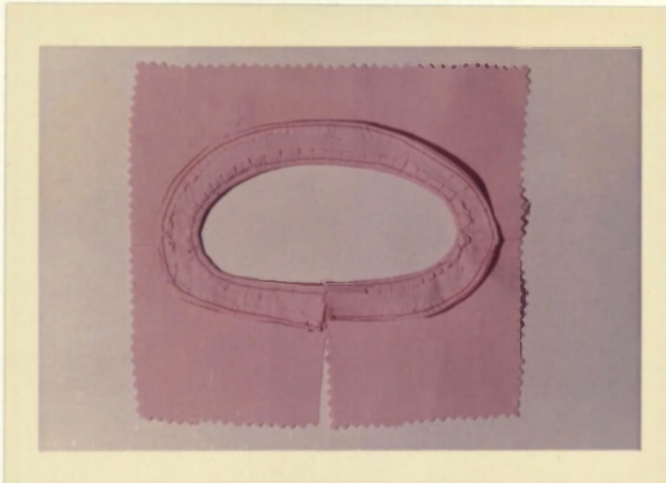
2

3



4

Samples for questions 15-24, continued.

5 

Skirt

Sample 6

Key

Directions:

Someone has given you a skirt that is only partially finished. It is to be a skirt without a waistband (hip hugger skirt). Tell everything that you would do to finish the top of the skirt (disregarding the zipper) to make it look neat, smooth and up to standards set in class.

Sample #6 (page 65) shows a seam on skirt.

1. Tell all the processes you would perform on the seam.
2. Briefly describe each process.
3. Tell the reason you would do each process.

You may take the skirt off the test to look at it.

Please do not write on this ditto. Write your answers on your paper in the following way.

Name of Process	Description of Process	Reason for Process
1. bridgestitching	sew 1/4 inch from raw edge	make it easier to cleanfinish edge
2. cleanfinishing	turn up raw edge 1/4 inch and sew	prevents raw edge from raveling when washed, ironed and worn
3. trimming	cut away 1/2 of seam allowance	cuts down on bulkiness of seam allowance; makes seam lie flatter
4. clipping	short cuts made into seam allowance 1/2 inch apart	reduces tension in curved seams so that seams can lie flat; prevents wrinkling of curved seam.
5. understitching	row of stitching approximately 1/8 inch from facing seam thru facing and both seam allowance on facing and garment	prevents facing from rolling forward and showing on right side of garment.

APPENDIX C

TEACHING METHODS

Traditional	Directed-discovery
PRINCIPLE #1	
Students - read fabric terms and definitions such as selvage, bias, crosswise and lengthwise grains, raw edge, and tried to remember them. - listened to teacher tell why a straight grainline is important to the way the final finished blouse looks. - listened to teacher repeat definitions of fabric terms as she pointed to their location on a piece of fabric. - watched teacher demonstrate how to straighten the grainline of a piece of fabric by pulling it on the bias. - straightened grainline, if necessary, on their own fabric as shown by teacher	Students - viewed a piece of red burlap and responded to question "How is this piece of fabric made?" to see that threads are woven at right angles to each other. - viewed transparency and overlays of fabric to see that a piece of fabric is made of a series of threads woven over and under and that the lengthwise threads and crosswise threads are at right angles to each other. - responded to question. "Do you think the threads would always stay in the position they are now in--at right angles to each other?" - looked at a sample of burlap on the overhead projector to see that threads can be moved out of position by pulling on the diagonal (bias). - formulated a definition for the gias and told how bias may be useful in working with fabric as a corrective measure to straighten threads in a piece of fabric when they are not at right angles. - responded to questions to see that threads must be at right angles

Traditional	Directed-discovery
	before cutting out pattern or threads in the garment will not be going up and across at right angles. With knowledge of structure of fabric students concluded that threads could possibly shift and then the garment would not fit as planned. - worked in committees of 4 or 5, cut a small notebook paper size circular skirt out of fabric which students had pulled on the bias to make the threads not at right angles. Students washed and ironed the skirt and compared its shape with the paper pattern to see that 1) when the threads of fabric are not at right angles the hemline of a circular skirt will not be even and if washed and ironed the threads might shift to form right angles, making the skirt a different shape than the pattern 2) fabric cut into curves will stretch - viewed one skirt on an overhead projector to see that stretching is when the threads have spread out in a curved or bias area such as the waistline of the skirt. - saw how the problem of fabric stretching relates to the blouse they will be making by responding to questions "Will there be curves

Traditional	Directed-discovery
	on the blouse? Bias?" "Could threads possibly spread out at these areas? Why?" "How will the blouse fit if the threads spread out?" (neck too large just as small skirt waist was too big) - saw that curves are really a form of diagonals which they saw earlier would stretch easily. Students reviewed stretchability of bias. - saw how finding a solution to prevent bias from stretching would also help to prevent curved areas from stretching. - all agreed that they should find a solution if their blouses were to turn out pretty.
Students - watched a teacher demonstration on pinning, cutting, sewing and pressing a blouse directionally. - pinned and cut out their own blouses.	Students responded to questions - "If sewing in the wrong direction makes threads move, is it possible that other methods or processes we do to the fabric could also make them move?" "What other methods or processes will you be doing to the fabric when you are making your blouses?" Students experimented and saw - threads in samples that were pinned against the grain spread apart or stretched - threads in samples that were pinned with the grain stayed in place

Traditional	Directed-discovery
Students - listened and watched while teacher demonstrated how and why staystitching is done on curves or bias parts of the blouse - staystitched their own blouses - responded to a quiz over fabric terms and staystitching	- each committee was given a 6" x 8" piece of fabric cut on the bias. One half of the fabric was marked "control". Students understood that the control wasn't to be tampered with in any way, just left on the table. - students saw teacher with the same size, color and kind of fabric also cut on the bias and watched teacher iron, "try on" and handle one half of the fabric as it would be handled if sewing on it. - students saw that when the two pieces of fabric are put back together as they were before being cut, that the experimental piece of fabric was longer and curved slightly in the center--its shape had changed. - students viewed both experimental and control pieces of fabric on an overhead projector to see that the threads of the experimental piece spread apart. - students concluded that ironing, handling, and "trying on" all contributed to the stretching of the fabric and that something should be done to the fabric before it was necessary to iron, handle or try on the blouses.

Traditional	Directed-discovery
	- students worked out criteria together to judge the results of the experiments they were to do with their 6" x 8" fabric samples. a) The solution must be such that it will keep threads from spreading out. b) The solution must be such that it can be used to prevent curved or bias parts of their blouses from stretching. - worked as a committee to find a solution - reported on experiment Saw that - neck edge stretched on the right side but not on the left side - the sewing direction could make a difference - since the left side didn't stretch and it was sewn from the shoulder down to the center front, perhaps if the right side were sewn from the shoulder to the center front, no stretching would occur

Traditional	Directed-discovery
PRINCIPLE #2	
Students - watched a teacher demonstration of applying a blouse neck facing and listened to definitions of bridge-stitching, cleanfinishing, trimming, clipping, understitching as they are performed on the blouse facing. - performed the processes on their blouses. - responded to a matching quiz of definitions, descriptions, and reasons for the processes.	Students - formed committees to experiment - concluded that curved seams make fabric wrinkled - a solution should be found - found possible solutions - reported on solutions

APPENDIX D

SUMS AND MEANS OF THE CRITERION AND CONTROL VARIABLES FOR TWO EXPERIMENTAL GROUPS--PRINCIPLE #1

		CRITERION		CONTROLS			
		Posttest		Pretest		Grade-point Averages	
Teaching Method	n	ΣY	$\overline{Y}$	ΣX_1	$\overline{X}_1$	ΣX_2	$\overline{X}_2$
Directed-discovery Group A	27	484	17.93	279	10.33	75.6	2.80
Traditional Group B	25	380	15.20	243	9.72	66.9	2.69
Total	52	864	33.13	522	20.05	142.5	5.49

KEY: ΣY = sum of posttest scores
$\overline{Y}$ = mean of posttest scores
ΣX_1 = sum of pretest scores
$\overline{X}_1$ = mean of pretest scores
ΣX_2 = sum of grade-point averages
$\overline{X}_2$ = mean of grade-point averages

APPENDIX E

SUMS AND MEANS OF THE CRITERION AND CONTROL VARIABLES FOR TWO EXPERIMENTAL GROUPS--PRINCIPLE #2

		CRITERION		CONTROLS			
		Posttest		Pretest		Grade-point Averages	
Teaching Method	n	ΣY	$\overline{Y}$	ΣX_1	$\overline{X}_1$	ΣX_2	$\overline{X}_2$
Directed-discovery Group B	25	820	32.8	299	11.96	66.9	2.69
Traditional Group A	27	669	24.78	327	12.11	75.6	2.80
Total	52	1489	57.58	626	24.07	142.5	5.49

KEY:
ΣY = sum of posttest scores
$\overline{Y}$ = mean of posttest scores
ΣX_1 = sum of pretest scores
$\overline{X}_1$ = mean of pretest scores
ΣX_2 = sum of grade-point averages
$\overline{X}_2$ = mean of grade-point averages

LIST OF REFERENCES

1. Ausubel, David P., "Some Psychological and Educational Limitations of Learning by Discovery." The Arithmetic Teacher, II (May 1964), 290-302.

2. Bloom, Benjamin S. (ed.), Handbook I: Cognitive Domain (New York: Longman, Green and Company, 1956).

3. Boleratz, Julia M., "Learning by Discovery: An Experimental Study to Measure Its Effectiveness for Teaching Value Concepts." The Journal of Experimental Education, Volume 36, Number 2, Winter, 1967, 13-21.

4. Broudy, H. S., B. O. Smith and J. R. Burnett, Democracy and Excellence in American Secondary Education (Chicago: Rand McNally, 1964).

5. Bruner, J. S., The Process of Education (Cambridge: Harvard University Press, 1960).

6. _____, "The Act of Discovery." Harvard Educational Review, XXXI (1961), 21-32.

7. Cassel, R. N., "Teaching Act and Learning Effectiveness." Educational Forum, XXIIX (March 1964), 303-6.

8. Cousins, J. E., "Development of Reflective Thinking in an Eighth Grade Social Studies Class." Indiana University School of Education Bulletin, XXXIX (May, 1963), 36-73.

9. Craig, R. C., "Directed versus Independent Discovery of Established Relations." Journal of Educational Psychology, XLVII (1956), 223-34.

10. Hall, Olive A., Research Handbook for Home Economics Education (Minneapolis: Burgess Publishing Co., 1967).

11. Haslerud, G. M. and Shirley Meyers, "The Transfer Value of Given and Individually Derived Principles." Journal of Educational Psychology, XLIV (1958), 293-98.

12. Johnson, Harry C., "What Do We Mean by Discovery?" _The Arithmetic Teacher_, II (December 1964), 538.

13. Kemp, A. L., "When Does Learning Take Place?" _International Journal of Religious Education_, XXXXI (September 1964), 6-7.

14. Kernaleguen, Anne, "Principles Approach to the Teaching of Beginning Clothing Construction." _Canadian Home Economics Journal_ (March 1964), 8-9 and 31.

15. Kersh, B. Y., "The Adequacy of 'Meaning' as an Explanation for the Superiority of Learning by Independent Discovery." _Journal of Educational Psychology_, XLIX (1958), 282-92.

16. Popham, W. James, _Educational Statistics_ (New York: Harper and Row, 1967).

17. Thorndike, E. L., _The Psychology of Wants, Interests and Attitudes_ (New York: Appleton Century Co., 1935), p. 147.

18. Tinsley, Willa V. and Margaret Sitton, "Teaching Intellectual Aspects of Home Economics." _Journal of Home Economics_, II (February 1967), 85-88.

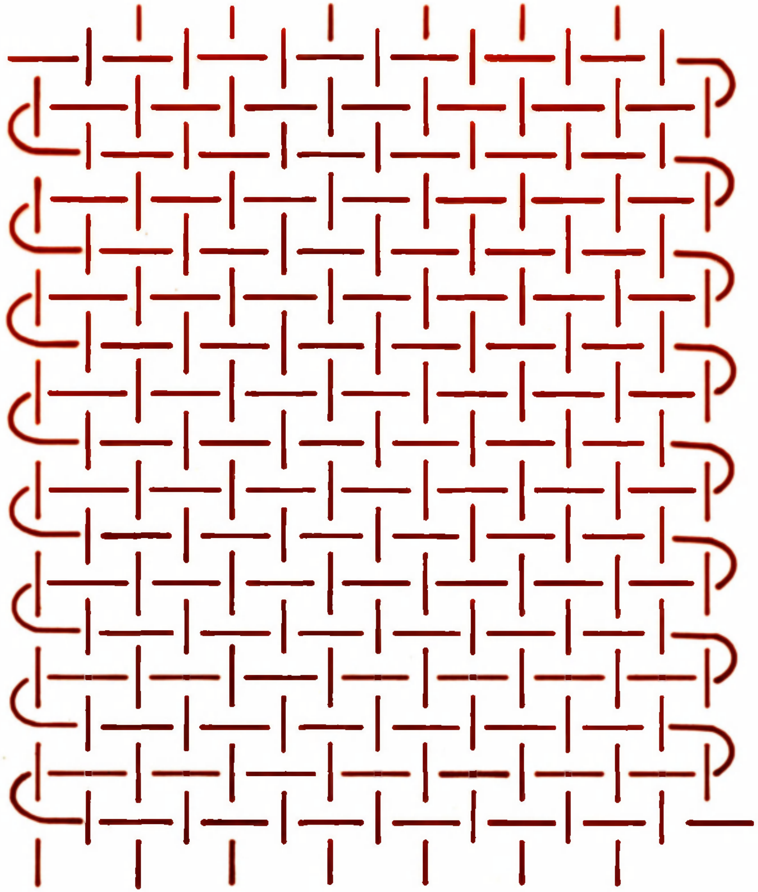
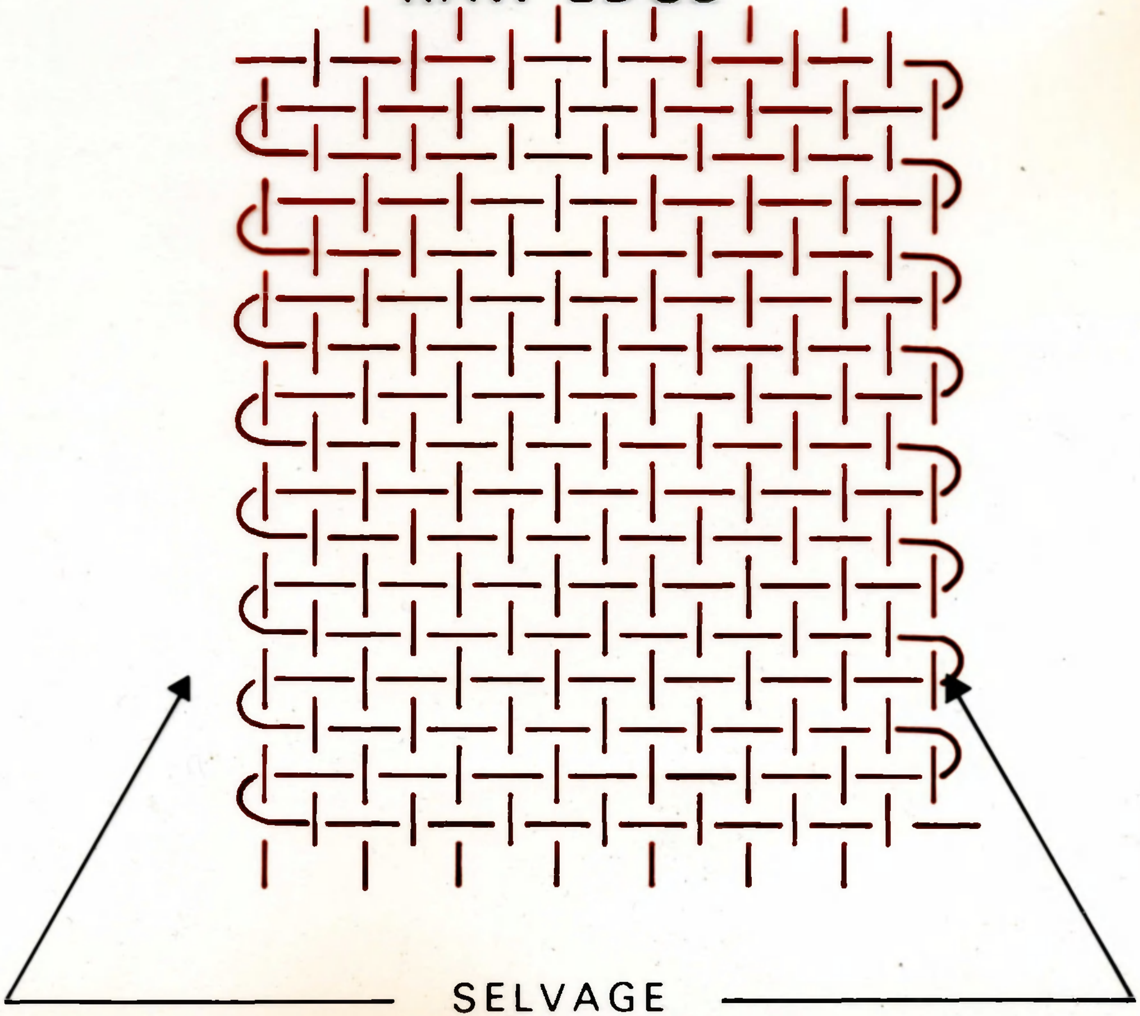


FIGURE 1 STRUCTURE OF FABRIC

RAW EDGE



SELVAGE

FIGURE 1 OVERLAY A

FIGURE 1 STRUCTURE OF FABRIC

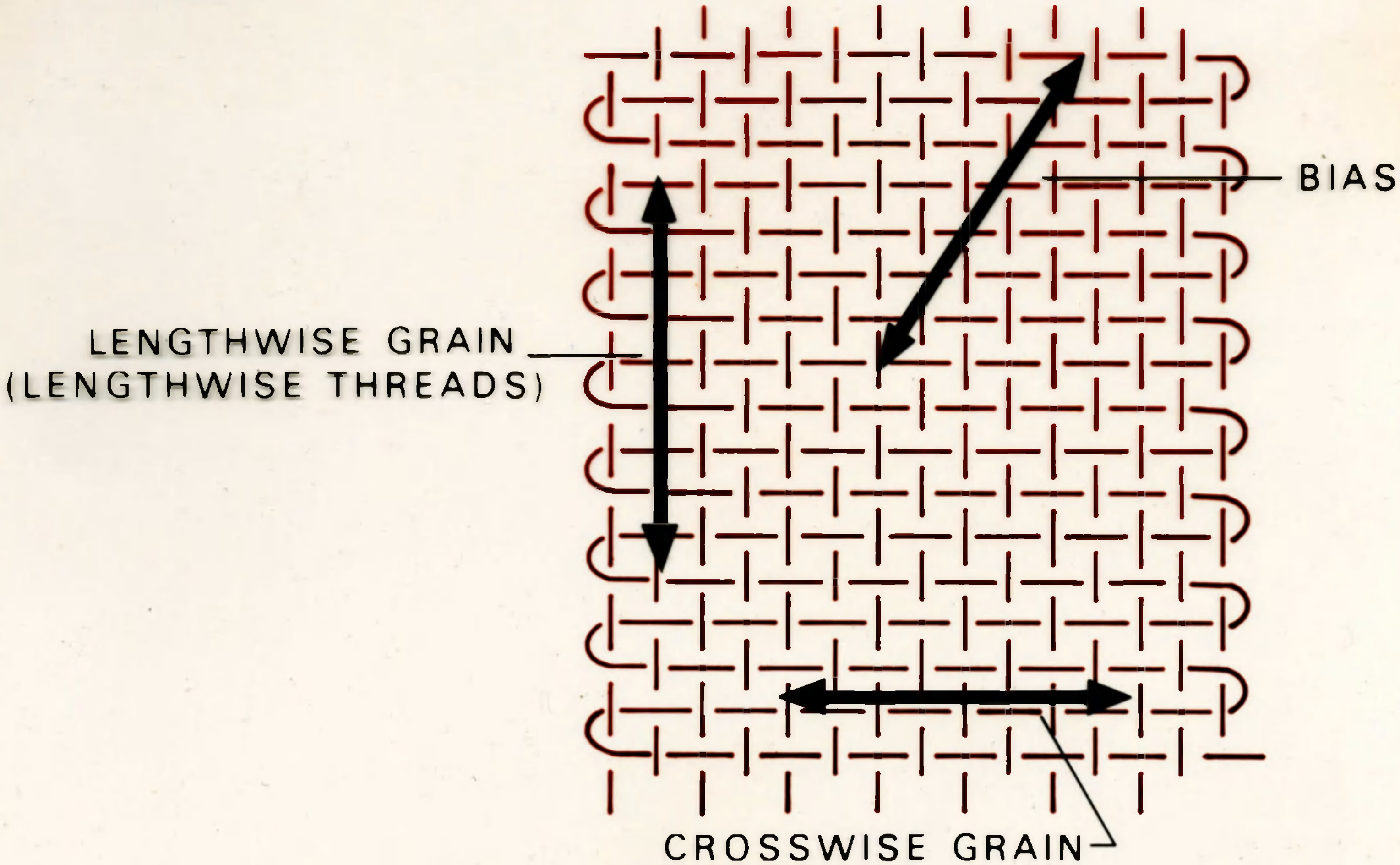


FIGURE 1 OVERLAY B

FIGURE 1 STRUCTURE OF FABRIC

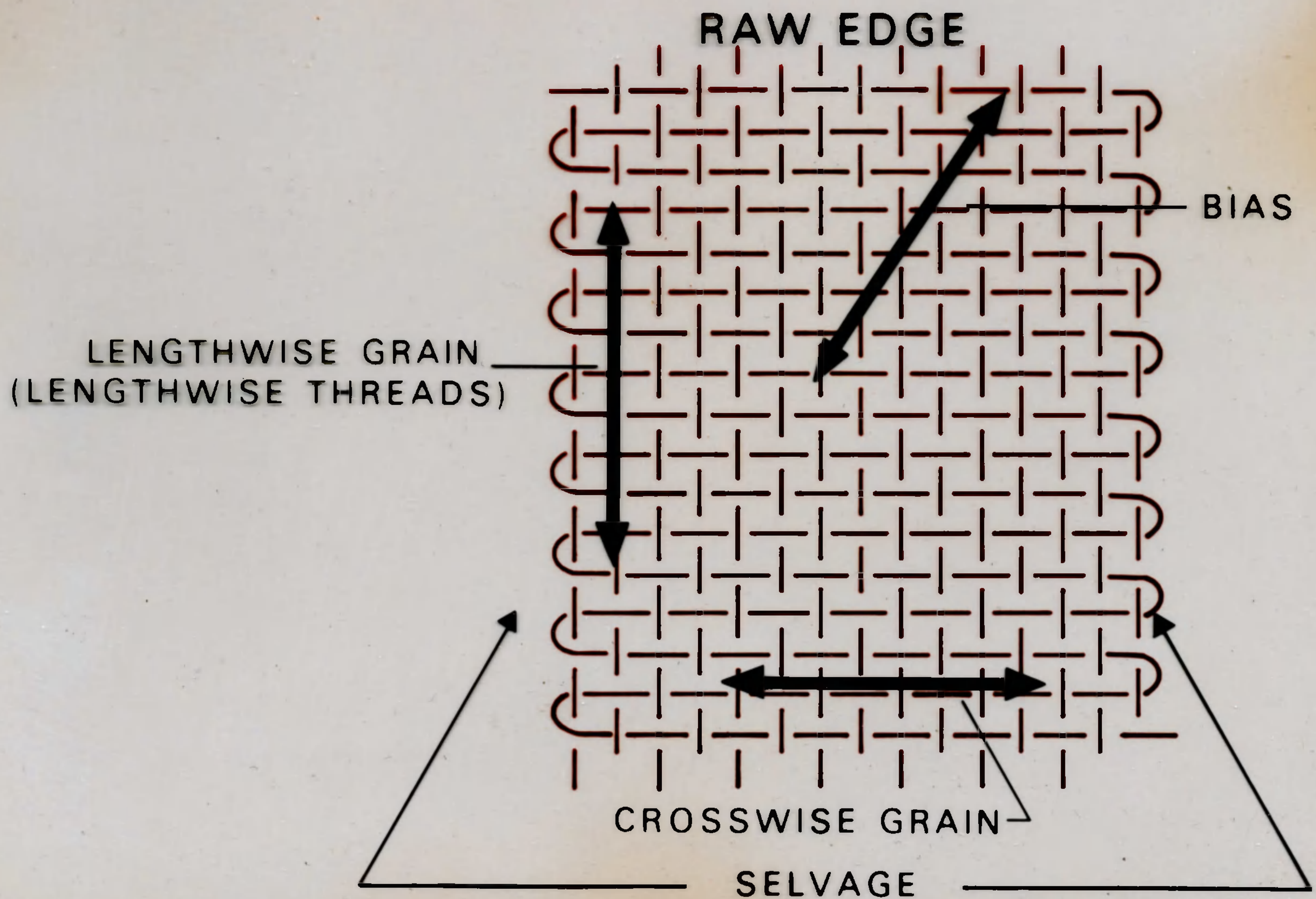


FIGURE 1 OVERLAY A
FIGURE 1 OVERLAY B

FIGURE 1 STRUCTURE OF FABRIC