Prediction of performance of students in college clothing construction courses

Sister Irene Burge
Iowa State University

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by

Sister Irene Burge

A Dissertation Submitted to the Graduate Faculty in Partial Fulfillment of The Requirements for the Degree of DOCTOR OF PHILOSOPHY

Major: Home Economics Education

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INTRODUCTION

Statement of the Problem

The present study was conducted in five universities located in the Maritime Provinces of Canada offering degree programs in home economics. These provinces are New Brunswick, Nova Scotia, and Prince Edward Island. In the Maritime Provinces instructors of the university elementary course in clothing indicated that students who enroll in the course have varying degrees of background preparation for the course. Some students have had six years of clothing construction in high school while others have had little or no experience in this subject. Some have had experience with clothing construction as part of a 4-H program. Home economics courses at the secondary level are not prerequisite for entry into the home economics programs at the universities. Therefore, the universities are faced with the problem of providing the basic learning experiences for students who have had no prior learning in clothing construction, as well as for those who have had prior experiences in this area.

Because of the variations in background it is difficult for the universities to present a course which will contribute to the greatest achievement of all members of the class. The present course arrangement, in which all students are expected to work toward a common set of objectives, does not seem to be the most effective. Therefore, it seems necessary to make adjustments in the basic clothing course in order to facilitate optimal achievement for each individual member of the class. Homogeneous grouping, which allows students with similar competencies to work together toward a common set of objectives and to have similar
learning experiences, could be one alternative to the present arrangement. Another alternative would be to provide individualized instruction for some students based on the individual's scope of knowledge of clothing construction processes and level of ability.

Before any decision can be made to adjust for variations in students' background experiences in clothing construction, some information on which to make decisions is necessary. The most efficient functioning of educational institutions, at any level, depends to a large extent on informed judgment. Systematic measurement is the means by which information for decision making is obtained. The importance and necessity of evaluation for institutions of higher education were emphasized by Hunt (1961) in the following statement:

It has long been recognized that evaluation both in a broad sense and in more specialized application, is necessary if the complex processes of higher education are to be administered more efficiently, effectively, and economically. However, there has been a marked and serious lack of any systematic consideration of the many types of judgments required in the conduct and direction of colleges and universities (p. ix).

Dressel (1961) described the alternatives to systematic evaluation in the following words:

Failure to engage systematically in evaluation in reaching the many decisions necessary in education means that decision by prejudice, by tradition, or by rationalization is paramount. Such patterns of decision making are not consistent with the aims of education, particularly with those of higher education, which in our culture are based upon the assumption that informed judgments can and should be wiser judgments (p. 6).

Because the primary goal of education is learning, one major function of educational evaluation is to provide information which will serve as a basis for making correct, intelligent decisions in directing student progress. Measurement and nonmeasurement techniques are involved in
evaluation. The present research project was concerned with the development of measurement instruments which would provide information for decisions with regard to student placement and with prediction of performance in beginning clothing construction at the university level. It was expected that, if these instruments were appropriate, information provided by them would aid in decision making and hence increase teacher effectiveness and maximize learning. Based on results of measurement students could be assigned to a particular treatment within the course for which behavioral objectives and learning experiences are designed so that optimal learning could be expected. Prediction of performance could be made using predictors that were shown to have predictive validity. No such measurement instruments have been studied in the universities of the Maritime Provinces of Canada to determine the level of ability of students and to predict performance of students in beginning clothing construction. It seems necessary to provide such instruments in order that adjustments can be made for differences in extent of knowledge and level of abilities related to clothing construction.

Objectives

The objectives of this research were:

1. To describe the clothing construction segment of beginning clothing courses at all universities located in the Maritime Provinces of Canada where degree programs in home economics are offered

2. To adapt and to test the predictive validity of predictive measures for use in the placement of students in beginning clothing construction
3. To provide a basis for recommending adjustments for individual differences among students in beginning clothing construction in universities in the Maritime Provinces of Canada.

Assumptions

The following assumptions form a part of the justification for this research: 1) coordination of basic courses in all disciplines in the universities of the Maritime Provinces would be expected by the Maritime Provinces Higher Education Commission; 2) the development of placement instruments would contribute to improvement of instruction and would facilitate coordination of elementary clothing courses; and 3) adjustments for individual differences would be desirable and feasible.

The following assumptions are related to the hypotheses: 1) any change in cognitive behavior as measured by the posttest would be due to the learning experiences of the course; and 2) the quality of instruction in clothing construction in the participating universities would be comparable.

Limitations

Geographically this research was limited to the Maritime Provinces of Canada. As stated later in this section, there are characteristics of this region which are unique to it and which justify considering the Maritime Provinces as a unit.

The location of the participating universities was such that it was costly in terms of time and money for the researcher to make personal
contact with the instructors. Two meetings were held with each instructor.

Participants in the study were limited to those enrolled in beginning clothing construction in 1972-1973 in the five universities located in the Maritime Provinces of Canada where home economics degrees are offered.

The research was limited in subject matter to competencies involved in clothing construction. No consideration was given to clothing design, clothing care, historical, economic, psychological or sociological aspects of clothing.

The researcher's absence from Iowa State University while data were being collected limited the opportunities for consultation regarding procedure.

Definition of Terms

The following terms were used in this research report and were interpreted according to the following definitions:

Target population, according to Snedecor and Cochran (1967), "is the aggregate about which the investigator is trying to make inferences from his sample" (p. 30).

The term, instructor, refers to the faculty member responsible for the clothing construction portion of the elementary clothing course. It does not refer to faculty rank.

Placement is understood as a classification decision in which, as Hills (1971) described it, individuals are assigned to "different treatments when there are several different predictor variables and several different treatments" (p. 701).
Description of the Maritime Region of Canada

The Maritime Provinces, situated on the east coast of Canada, have a population that is "small, scattered, non-industrialized and low in productivity" (Hurtubise and Rowat, 1970, p. 32). They have a "certain degree of cultural similarity, common interests and . . . considerable economic problems" (Hurtubise and Rowat, 1970, p. 191). There are three complete, independent governmental bodies in this region which together is the smallest area of Canada with a population one-quarter that of Ontario. Since 1968, efforts have been made on the part of the three provincial governments to investigate the "possible advantages and disadvantages of closer cooperation between the three provinces, including the ultimate step of political union" (Crean, Ferguson and Somers, 1969, p. 16).

The rationale for proposing closer cooperation with regard to higher education among the three provinces was expressed by Crean, Ferguson and Somers (1969) in the following words:

The Maritimes are economically much less fortunate than other areas of Canada, and their scarce resources should be used with that much greater care. This is particularly true in the case of universities which are called upon to play such a crucial role in both the economic and social development for the future. It makes sense to inquire whether a more efficient use of public resources could not be made if there was a greater measure of cooperation both between the universities themselves and between the governments that so extensively support these universities. Costly duplication could be avoided. Expensive and unproductive rivalry between institutions in different provinces could be more effectively curbed, and resources could be concentrated more efficiently to ensure the optimum value for public money in terms of economic and social development (p. 15).

Further, these authors commented:
This region is made up of several small provincial jurisdictions in which there is little overall planning for the coordinated development in higher education. These provinces clearly form one interdependent and coherent region as far as higher education is concerned (p. 15).

Pertinent Developments in Higher Education in the Maritime Provinces

Because of increased enrollment and rising costs in the 1960's, regional interprovincial cooperation was seen to be a necessity. During this decade there were "some regional agreements involving both the provincial governments and the universities . . ." (Hurtubise and Rowat, 1970, p. 190).

At the university level, the Association of Atlantic Universities (AAU) was established in 1964 with representation from all universities in the region. The objectives of the AAU were:

a) To assist the co-ordination of higher education in the Atlantic provinces;
b) To ensure high academic standards in a period of rising costs of academic personnel, laboratories, libraries, etc.;
c) To avoid unnecessary duplication of faculties and courses of study (Hurtubise and Rowat, 1970, p. 191).

Various committees of AAU, representing different segments of the university community, work to coordinate the activities of these segments of all universities in the region. The Committee of Academic Vice-Presidents of the Maritime Universities, a committee of AAU, meets regularly to discuss cooperation in various academic matters. In Fall, 1973, this committee plans to undertake a study of each program offered in the Maritime universities with the objective of eliminating unnecessary duplication and ensuring high standards (Jeffrey Holmes, Executive Director of AAU, personal communication, July 25, 1973).
Meetings of the chairmen of home economics departments of all universities offering home economics degree programs began in Fall, 1972. The purpose of these meetings was to discuss areas of duplication of specialization with the goal of obtaining agreement to eliminate or avoid such duplication (Dr. Mary Morley, chairman, Mount St. Vincent University, personal communication, July 24, 1973).

At the government level, steps have been taken which indicate "The governments of the Atlantic Provinces have recognized in our day the value of their institutions of higher learning. Lack of interest has been replaced by genuine concern and measures of financial assistance" (Somers, 1966, p. 34). During the 1960's the activities of government were geared to independent developments within each province. Somers (1966) cites some of these activities:

The Royal Commissions on Higher Education in New Brunswick (1962) and Prince Edward Island (1964), and the appointment of a University Grants Committee in Nova Scotia (1963), all testify to the new spirit (p. 34).

In 1967 the New Brunswick Higher Education Commission was created and in 1968 the Commission on Post-Secondary Education for the province of Prince Edward Island was established (Hurtubise and Rowat, 1970, pp. 218, 220). The powers of the three post-secondary bodies included advising the government on the needs and pattern of future development, on the financing of universities and colleges, on the courses of study and standards, and on duplication of services (Hurtubise and Rowat, 1970, p. 219).

In 1969, at the request of the governments of the three Maritime Provinces, the AAU conducted a study of higher education in the region. "The terms of reference required an assessment of existing forms of
cooperative endeavour and the new forms that may be required" (Crean, Ferguson and Somers, 1969, p. 9). The report of this study (Crean, Ferguson and Somers, 1969) was submitted to the governments of the three provinces and included recommendation for the establishment of a Maritime Provinces post-secondary commission. The Maritime Provinces Higher Education Commission was created by legislation in each of the three provinces in Spring, 1973 (Government of New Brunswick, 1973; Government of Nova Scotia, 1973; Government of Prince Edward Island, 1973).

As stated in the Act of Legislation, "The purpose of the Commission is to assist the Provinces and the Institutions in attaining a more efficient and effective utilization and allocation of resources in the field of Higher Education in the Region" (Government of Prince Edward Island, 1973, p. 3). One of the duties of the Commission defined by the Act is to "assist and encourage Institutions in establishing or continuing cooperative arrangements among themselves . . ." (Government of Prince Edward Island, 1973, p. 3).

Cooperation, then, is the goal of both the governments and the universities of the Maritime Provinces. Existing programs may be faced with extinction or adjustments if one of the groups studying higher education considers it necessary. It seems, therefore, that it is important for the universities to do some systematic evaluation of their own courses and programs. The present study could contribute to such an evaluation.
REVIEW OF LITERATURE

Because one of the objectives of this research was to provide a basis for curricular recommendations to the five participating universities, the review of literature includes aspects of curriculum planning and revision. This topic is discussed under the following headings: curriculum principles, variations in students' educational backgrounds, and curricular adaptations for variations in students' educational backgrounds.

A major objective of this research was to develop and test instruments for placement of students in clothing construction classes. Some discussion of placement and placement tests was considered pertinent to this research and is included in the review of literature. Specifically, the following aspects were considered relevant and are discussed in this section: purpose of placement, procedures used for placement, and effectiveness of procedures and instruments used for placement. As an alternative to placement, individualized instruction is discussed as well.

The review of literature indicated that there was no satisfactory standardized instrument available for determining the preinstructional level of clothing construction competence for college students. Independent studies involving the use of devices for measuring clothing construction competencies were conducted at several universities in the United States after 1944. Creekmore (1971) included in her report of instruments developed for measuring various clothing variables, a resume of some of the research involved in developing instruments for use in clothing construction. Among these were reports of two instruments developed to determine the level of knowledge of clothing construction
of college students. The research involved in the development of these two instruments is reviewed in the following pages (Marshall, 1967; Semeniuk, 1961). Creekmore (1971) included references to other studies that were conducted for the purpose of developing instruments for determining clothing construction competencies. She also presented a list of 16 colleges in the United States where clothing construction achievement tests were used.

Because the Iowa State University Placement Test was adapted for use in the present research, the studies conducted on the Placement Test at Iowa State University are reviewed. A number of studies conducted at other universities are reviewed as well. Selection of the studies reviewed was based on consideration of the purposes and methods which were similar to those used in the present research. The following criteria were used as guidelines for the selection.

1. The preinstruction tests and questionnaires were used for prediction of performance in clothing construction (Berry, 1963; Epps, 1972; Hoskins, 1959; Johnson, 1953; Marshall, 1967; Rothgarn, 1962; Semeniuk, 1961).

2. The research project involved the development of tests for use in more than one university (Hoskins, 1959; Witt, 1961).

3. The pretest was adapted from tests used in the same or other universities (Berry, 1963; Caudill, 1968; Marshall, 1967).

4. A pretest was readministered as a posttest (Johnson, 1953; Marshall, 1967).

5. The research involved the development of a test to determine
students' strengths and weaknesses in clothing construction competencies (Semeniuk, 1961).

6. The purpose of the pretest was to identify students' abilities to comprehend and apply principles of clothing construction (Rothgarn, 1962).

7. The research was conducted as a first step in the planning of individualized instruction (Epps, 1972).

Curriculum Principles

Educators generally agree that the most effective instructional program is one that recognizes what the student already knows and guides him from the point of his initial achievement level to the desired achievement level defined by objectives of a course or program (Glaser and Nitko, 1971, p. 630). This implies that initial student behavior is known, that educational objectives are defined in terms of students' needs, and that the educational environment is designed to achieve these objectives. These are tasks that are involved in curriculum development and revision. Dressel (1971) identified four stages in curriculum planning as: "1) definition of objectives, 2) selection of learning experiences, 3) organization of experiences, and 4) evaluation" (p. 25). Commenting on the execution of these stages, Dressel (1971) said:

After the decision is made to develop, study, or revise a program or curriculum, the logical starting point is the objectives, which should be formally stated rather than assumed to be self-evident. Appropriate educational experiences are selected to realize these objectives and are organized into courses, curriculums, or procedural patterns. Collection of data and evaluation of the program may then result in revision of the program through modification or replacement of any or all of the elements of the preceding stages (objectives, experiences, organization of the experiences, or evaluation (p. 35).
One of the bases for the derivation and revision of objectives identified by Dressel (1971) is students' educational needs. In an earlier text, Dressel (1963) defined need as "a discrepancy between the characteristics which students presently have and the characteristics which it is judged they ought to have" (p. 26). Glaser and Nitko (1971) indicated that identification of students' educational needs involves measurement. They said:

... diagnosis of the characteristics of the learner—involves measurement of the behavior with which a student enters into instruction, including (a) the extent to which the student has already acquired what is to be learned, (b) the extent to which he has the necessary prerequisites, and (c) the characteristics of the way in which he learns that interact with the available instructional alternatives. These measurements provide information about the existing preinstructional behavior of the learner as distinguished from the performance competence to be achieved (p. 626).

When objectives are developed, based on the identified needs of students relative to the course or program, the selection of learning experiences must be made. Dressel (1971) listed the following learning experiences which may be used in any attempt to have students achieve educational objectives:

1. Materials (textbooks, supplemental required or optional readings, teaching machines, current periodicals, syllabuses, slides, films, tapes, recordings, television).
2. Instructional methods (lectures, discussions, demonstrations, role playing, cases, problems, individual conferences, seminars, guest speakers, telephone interviews).
3. Assignments (readings, problems, papers, oral reports).
4. Activities (laboratory, field trips, independent study, observation, internships, work experience, travel, public lectures, concerts, plays).
5. Evaluation methods (objective tests, essays, papers, reports, participation, peer judgment, self-evaluation) (p. 38).

Dressel (1971) recognized that no course could effectively use all of these suggestions but selection of those appropriate to the objectives of a course is necessary.
Regarding the organization of experiences, Dressel (1971) identified three criteria: continuity, sequence, and integration (p. 40). Commenting on continuity as a criterion for organizing experiences he said, "There must be continuity so that later learning experiences will reinforce earlier ones" (p. 39).

In his comments on evaluation Dressel (1971) said that it is involved in every stage of curriculum development and the impact of a program "can be measured only by comparing the students' status before the program with their status at its conclusion" (p. 41). The curriculum principles discussed by Dressel (1971) were consistent with those formulated earlier by Tyler (1969).

Variations in Students' Educational Backgrounds

One of the difficulties experienced by many teachers in providing instruction for optimal learning is the variation in background experiences and abilities among students who enter a particular course. Juola (1961) identified this problem at the college level in this way: "A recurring dilemma for teachers at the college level . . . results from the need to provide instruction for students with a wide range of ability and previous experience" (p. 324). Dressel (1963) also recognized the existence of a wide range of experiences and abilities among entering college students as identified by test results. He commented that the use of tests "has made very clear that students at the beginning of their college education vary extremely in their background" (p. 18).

In relation to clothing construction at the college level Souligny and Sisler (1972) described the situation in these words:
Clothing instructors have long been aware that students entering college vary in their abilities and experiences in clothing construction. Some students have previously completed as many as 6 years of home economics in junior and senior high school and/or several years in 4-H club work, while others have had no formal instruction in clothing construction (p. 23).

Decisions regarding curricular accommodation for variations in preparedness of students for a course call for information about the pre-instructional level of behavior of students. On the necessity of identifying readiness for learning in planning instructional environments Saupe (1961) commented:

The general principle is that without appropriate readiness a learning experience will be inefficient or learning will not occur. The principle emphasizes learning as a sequential process, in which past learning serves as a foundation for present and future learning.

General mental ability and previous academic accomplishment obviously have a significant influence on the student's ability to learn new material (p. 56).

From the point of view of the college instructor and his effectiveness in guiding learning, the importance of knowing the backgrounds of the students was identified by Parent, Vaughan and Wharton (1971). They stated that "the more information an instructor has about the background, interests, experiences, and values of his students, the better equipped he will be to adapt his course to meet the needs and interests of that particular group" (p. 134). Reporting on an "experimental communication-evaluation project conducted in 1969 by the Bureau of Institutional Research at the University of Minnesota" (p. 133), Parent et al. said: "There was consensus among the faculty participants that information about student backgrounds and interests available early in the quarter was helpful in planning course events and materials for particular groups" (p. 136).
The necessity for home economics teachers to identify student background educational experiences was recognized by Chadderdon (1971). She commented:

The discovery of individual differences and diagnosis of learning difficulties is a particularly important purpose if the teacher is to plan learning experiences that meet the needs of all pupils in her classes. Knowing where a pupil is in the learning sequence is essential for planning next steps (p. 1).

Although the above comment was made in reference to the secondary level of education, the principle stated applies also to higher education. Some efforts have been made at the college level to determine the level of achievement of students in clothing construction. Souligny and Sisler (1972) reported that "Pretests and exemption tests to determine the student's level of achievement in clothing construction have been developed at several universities" (p. 23).

Methods for determining the level of achievement vary. Saupe (1961) explained two methods which were valuable in evaluating levels of pre-instructional behavior. He said:

The general levels of ability of students may be estimated by examinations typically given at the beginning of their college experience . . . . Two methods of studying educational readiness for particular courses are available. The first is an analysis of the previous educational experiences of students . . . . Although the review of a student's prior education is a valuable and often necessary means for adjusting experiences to levels of readiness, its limitations are obvious. It is difficult if not impossible to identify the exact nature of previous experiences . . . . The second method of determining readiness, then, consists of tests given at the outset of a course or program of instruction. Such pretests can be developed only when the knowledge and abilities required for success in a course or program have been identified (p. 57).

Gronlund (1971) claimed that the use of a variety of evaluation techniques is desirable (p. 22).
For the purpose of identifying the levels of knowledge and ability of
students prior to entry into a course the process of measurement should be
guided by principles of evaluation. Gronlund (1971) suggested the follow­
ing principles as guidelines in the process of evaluation:

1. Determining and clarifying what is to be evaluated always has
priority in the evaluation process (p. 21).
2. Evaluation techniques should be selected in terms of the pur­
poses to be served (p. 22).
3. Comprehensive evaluation requires a variety of evaluation
techniques (p. 22).
4. Proper use of evaluation techniques requires an awareness of
their limitations as well as of their strengths (p. 22).
5. Evaluation is a means to an end not an end in itself (p. 23).

The guidelines discussed by Gronlund (1971) were similar to those identi­

Curricular Adaptation for Variations in Students' Educational Backgrounds

The need for curricular adaptations for variations in students' educational backgrounds was recognized by several authors. Although in the following remarks, Lindvall and Cox (1969) referred to individualized instruction at the secondary level, what they had to say applies to any situation where accommodations are not made for individual differences in preparedness for a course. These writers said:

It would be wasteful to have the pupil assigned to a unit of instruction which he had already learned, while, on the other hand, it would be frustrating for the pupil to be given an assignment for which he did not have the necessary prerequisites and which, therefore, he could not accomplish (p. 169).

In planning learning experiences at the college level Dressel (1963) suggested that consideration be given to previous learning of the students. He stated that higher education is not
. . . entirely separable from preceding levels of education. Indeed it should not be; rather it should be a continuation, sequential rather than repetitious in nature. It is therefore necessary that the student's higher education experience differ in nature, as well as in content, from his earlier education (p. 70).

Having established that there are wide variations in educational backgrounds among college students and that there is a need for providing learning experiences based on earlier experience, Dressel (1971) suggested that a "climate for learning" be developed. He stated that developing a "climate for learning" includes "increased homogeneity in background and ability, and increased commonality of experience . . ." (p. 70). This implies that he recommended homogeneous grouping of students on the basis of similarities in level of knowledge and ability, and the planning of appropriate learning experiences.

The desirability of making adaptations in the educational environment to adjust for variations in students' backgrounds was recognized by Glaser and Nitko (1971). They referred to the process of curricular adaptations for individual differences as "designing the instructional environment." They described this process as follows:

Once the nature of the task to be learned and the entering characteristics of the learner are described, the third activity—designing the instructional environment—can take place. The design of the instructional environment involves the specification of the conditions under which learning can occur. These conditions allow the learner to progress from an entering-behavior state to the terminal state in which he has acquired the educational goals described as subject-matter competence and the desired outcomes of instruction. This requires the design and construction of the teaching procedures, materials, and tests that are to be employed in the educational process. Also included are provisions for conditions that will result in the motivation to use, maintain, and extend the competence that is taught. The information required for the design and construction of the learning environment has two purposes. One is information for making decisions about how instruction is to proceed; the other is
information required for modifying the design of instructional procedures, materials, and equipment. With regard to the first, as instruction proceeds, information for instructional decisions must be provided to the teacher, the student, and possibly to a machine, each of which assists in guiding the student through the course of instruction (p. 626).

Each institution needs to make its own decisions regarding whether or not to make adjustments for variations among students. As Dressel (1971) said: "Each college must determine the extent to which it will respond to the common needs of all students and to the individual needs of each student" (p. 37).

If an institution decides to make adjustments in the instructional environment to accommodate students whose backgrounds vary, several alternatives may be considered. Glaser and Nitko (1971) suggest one pattern of adaptation which they described as follows:

... different students are taught by different instructional procedures, and the sequence of educational goals is not necessarily common to all students. This pattern can be implemented in different ways ... At the present time, it seems possible to develop educational methods that are more sensitive to individual differences than procedures have been in the past. Educational systems for accomplishing this will no doubt take many forms and have many nuances as they are developed (p. 631).

Saupe (1961) offered the following suggestions for adjusting the learning environment to accommodate students with variations in preparedness for a course:

The tailoring of objectives and methods of instruction to the readiness levels of students is an essential characteristic of programs which take cognizance of readiness for learning. Two basic approaches to the use of information regarding student readiness in the selection and organization of learning experiences are available. The first tries to make sure that the general level of instruction is matched with the general level of readiness of the students. If students are reasonably homogeneous, this may be effective. The second approach involves the differentiation of instruction to suit best the individual differences among students. This may lead to sectioning students...
on the basis of ability of previous experience, but even then differences among students in any section will be found. These are the result of errors in measurement of the qualities used in sectioning and variation in other qualities not measured, and hence, uncontrolled in the sections. Accordingly, some attempt to adjust experiences for individual students is always appropriate by sectioning, by variations in assignments, or by teaching method (p. 58).

As Saupe (1961) indicated, the learning environment can be adjusted by adapting instruction to meet students' educational needs either within a group that is more or less homogeneous or on an individual basis. When instructional practices are adapted to individual requirements the process is referred to as individualized instruction. Cooley and Glaser (1971) commented that any attempt at individualization requires that

... the educational process is operationally defined and translated into specific school practices. The basic requirement for this is the presentation of an instructional model which underlies and generates (i) the instructional procedures, materials, and school environment and (ii) the data and research information needed for performing the desired educational functions effectively (p. 94).

Lindvall and Cox (1969) proposed a model for individualization of instruction which they called the "structured-curriculum model." They explained this model in the following words:

Basically, the structured-curriculum model for individualized instruction involves the following elements:
1. Sequences of instructional objectives to define the curriculum
2. Instructional materials to teach each objective
3. An evaluation procedure for placing each pupil at the appropriate point in the curriculum
4. A plan for developing individualized programs of study
5. A procedure for evaluating and monitoring individual progress (p. 161).
Placement

If an institution of higher education decides to use homogeneous grouping as a method of adapting the instructional environment to the needs of students certain procedures should be followed. Some of these procedures are discussed in the following pages.

At the college level homogeneous grouping is referred to as placement or sectioning. Juola (1961) reported that placement programs have been used in many colleges in an effort to provide appropriate instruction for students with a "wide range of ability and previous experience" (p. 324). A number of universities in the United States have developed programs for placement of students in beginning clothing construction courses. These include Iowa State University (Shaw, 1971), Ohio State University (Caudill, 1968), Oklahoma State University (Berry, 1963), South Dakota State University (Semeniuk, 1961), University of New Mexico (Hoskins, 1959), and University of Tennessee (Marshall, 1967). Some of the research leading to development of placement instruments is reviewed in the following pages in the section titled Related Research.

Hills (1971) commented on the procedures used for placing students at the college level in the following remarks:

Procedures vary, but a quite common approach is to administer a subject-matter test during the senior year in high school or sometime before the initial registration for college classes and decide on the basis of that test into which treatment level or kind of instruction to assign the student in that subject (p. 702).

Although standardized tests in some subject-matter areas are available for purchase, Juola (1961) suggested: "The greatest satisfaction is usually derived from building a test specific to the local courses" (p. 326).
Hills (1971) indicated that from the point of view of the learner the purpose of placement is

... to situate the student in the course or treatment that will challenge him but will not overwhelm him—to prevent his wasting time or being bored on the one hand and to prevent his failure due to lack of preparation or lack of sufficient repetition or explication on the other (p. 702).

From the point of view of the instructor Chauncey and Frederikson (1951) stated its purpose is to "reduce the range of individual differences in instructional groups and thus make possible a type of instruction and educational environment more nearly suited to the needs of each individual student" (p. 114).

**Effectiveness of placement procedures**

Whatever the source of the test or other instruments used for placement, certain measures of effectiveness of the instruments and of placement decisions are required. Cronbach (1971) commented that "In the classical decision-oriented study, the outcome measure, or criterion, is central" (p. 487). Chauncey and Frederikson (1951) suggested that "The most important criteria are those which give the best prediction of achievement" (p. 114). While Hills (1971) in the following comments referred to sequential placement, the ideas he expressed regarding criteria to determine the effectiveness of placement apply to sectioning within a course. He stated:

If a placement procedure is to be worthwhile, it must be worthwhile for something. The usual criterion has something to do with successfully passing a course or with the level of achievement in a course... And if too many fail the routine course when placement is operating, again the placement is not successful—it was introduced to prevent unnecessary failure (p. 706).

Juola (1961) explained the importance of determining the validity of
procedures used for the placement of students in appropriate levels of a course. He said:

Evidently, in evaluation made for purposes of student selection, classification or placement, the concept of predictive validity becomes basic. The data, unlike the scores on course examinations, are not regarded as criteria in themselves but as indicators of the student's later academic achievement. The central question becomes that of determining whether students who are considered adequate or inadequate on the evaluation instruments are actually adequate or inadequate on other more direct criteria of academic success. Regardless of who makes the decision, its validity is determined by the subsequent success or failure of students who have followed the required or suggested course of action (p. 305).

In his commentary on the use of grades to determine success in a course Cronbach (1971) said:

The criterion provided by course marks is notoriously unsatisfactory, but the ease of obtaining such data makes them the most common of all outcome measures. The difficulties are least serious when all the grades were assigned by a single teacher in a single class, since, then, the students are likely to have been located on the same scale. But there is no guarantee that this scale truly represents mastery of the course (p. 491).

Juola (1961, p. 305) also recognized that grades were commonly used as a criterion for placement and that difficulties in interpretation of them existed because of subjectivity of scoring.

As another criterion for evaluating the effectiveness of placement, Hills (1971) recommended student satisfaction with placement. He stated:

Another criterion which is not often considered but which seems an important aspect of sound placement . . . is the criterion of student satisfaction . . . . One check on whether placement is operating properly would then be whether students were satisfied with the placement that they experienced (p. 706).

In determining effectiveness of placement procedures it is essential to establish the effectiveness of instruments used for the purpose of making placement decisions. Content and criterion-related validity,
reliability, and objectivity are characteristics which such measurement devices should possess (Fox, 1969, p. 352). On the necessity of determining the appropriateness of placement instruments Hills (1971) stated:

... institutions often use a test as a device upon which to base placement. In many cases there is little or no evaluation of the appropriateness of the test that is used except perhaps to see that it has a reasonable name. More evaluation than that is in order. The semantic soundness and the content and criterion-related validity of the test should be questioned (p. 706).

The procedure followed in estimating criterion-related (or predictive) validity of instruments used for placement was outlined by Juola (1961) in this way:

In study of predictive validity the relationship between prediction variables and the criterion is usually ascertained by correlation analysis. The correlation coefficient has the advantage of reducing the data to be analyzed to a single composite figure, which describes the over-all relationship (p. 307).

Instruments used for prediction should also possess content validity. Because any test is composed of items which sample the universe of possible situations, the sample should be representative. "The content validity of such a test is determined by the representativeness of its content" (Ahmann and Glock, 1967, p. 279). Content in this sense refers to both the subject matter and types of behavior involved in the educational objectives.

The term, face validity, is frequently used in reference to measurement instruments. According to Fox (1969), "This claim for the validity of an instrument is based upon a superficial examination of the nature of the instrument, that is, the face of the instrument" (p. 368).

Reliability, according to Fox (1969), is "the basic attribute which every procedure must possess" (p. 352). He explained the meaning of
reliability in the following words: "By reliability we mean the accuracy of the data in the sense of their stability, repeatability, or precision" (Fox, 1969, p. 352). Commenting on the importance of using reliable instruments in a prediction study Stanley (1971) said:

In any study of prediction . . . some degree of reliability in the measure of the criterion being predicted . . . is imperative, if one is to achieve better than chance any prediction of individual differences on the one hand or any evidence of improvement on the other. One can make no worthwhile prediction of a completely unreliable criterion, or of a perfectly reliable criterion with quite unreliable predictors . . . . The accuracy of prediction that it is possible to achieve is limited by the reliability of the measure through which the performance is manifested. Data on reliability of predictors and criteria are necessary if the research worker is to be able to interpret the extent to which imperfect correlation between predictors and criteria is due to lack of overlapping function (or common variance) and the extent to which it is due to lack of precision in the measures (p. 358).

Reliability estimates are commonly determined by one of three methods depending on the testing procedure. A coefficient of stability is obtained when the following procedure is followed: "The test is administered, a period of time passes and the same test is administered again" (Brown, 1970, p. 62). For this situation "no differential learning should occur between the two administrations" (Brown, 1970, p. 62). A coefficient of equivalence is calculated when two equivalent forms of a test are administered (Brown, 1970, p. 63). "The third class of estimates usually assumed under reliability are measures of internal consistency" (Brown, 1970, p. 61). This is used when one administration of one form of test occurs. In the present research the latter testing procedure was followed and the reliability coefficient was calculated using the Kuder-Richardson Formula 20. Commenting on the interpretation of the reliability coefficient calculated by the Kuder-Richardson Formula, Brown (1970) said:
One basic assumption of the Kuder-Richardson formulas is that the items on the test are measuring one common trait or factor, i.e., that the test is homogeneous . . . to the degree that the test items are heterogeneous the value of $r_{tt}$, as computed by K-R 20, will be lowered (p. 79).

In his comments on the use of the Kuder-Richardson formulas, Payne (1968) said that the assumption that the items in a test are measuring a common factor is

... of critical importance when estimating the reliability of a classroom test. In many instances such tests are not homogeneous with respect to content and/or learning outcome measured (p. 137).

Therefore, he recommended that caution be exercised in interpreting the reliability coefficient calculated by the Kuder-Richardson formulas.

There are factors both within the test and outside the test which affect the reliability estimate. Gronlund (1971) identified the following as factors that influence reliability: length of test, spread of scores, difficulty of test, objectivity, and methods of estimating (pp. 113-117).

In his comment on the spread of scores Gronlund (1971) said, "Other things being equal, the larger the spread of scores, the higher the estimate of reliability" (p. 114). About the difficulty of the test Gronlund (1971) said:

Tests which are too easy or too difficult for the group members taking it will tend to provide scores of low reliability. This is due to the fact that both easy and difficult tests result in a restricted spread of scores (p. 115).

Literature on the subject did not give precise recommendations as to what the size of the coefficient of correlation should be. Gronlund (1971) said that the acceptable value of the coefficient depends on the importance of the decision to be made on the basis of test results. He commented:
for important decisions which are irreversible and apt to have great influence on the lives of individual pupils, we shall make stringent demands on the reliability of the measure we use. For lesser decisions, and especially for those that can be later confirmed or reversed without serious consequences, we shall be willing to settle for less reliable measures. Thus, it depends largely on how confident we need to be about the decision being made. Greater confidence requires higher reliability (p. 120).

Saupe (1961) suggested some typical values for the reliability coefficient. He said:

Commercial test makers usually report consistency coefficients in the range .85 to .95 for mental ability or achievement tests. Superior "teacher-made" achievement tests of 100 or more items usually produce internal consistency coefficients of .80 to .90. An instructor should expect a forty- or fifty-item objective test to yield an internal consistency coefficient of .50 to .60 (p. 444).

Objectivity is another characteristic identified as desirable for placement tests. Objectivity was defined by Fox (1969) as "the extent to which the data obtained are a function of what is being measured" (p. 380). Determination of objectivity of measurement instruments involves a "judgment which the researcher must make as he evaluates the research situation, the directions and the nature of the instrument" (Fox, 1969, p. 381). Brown (1970) explained objectivity in relation to the recording and scoring of responses as follows:

Scoring is objective in that there are predetermined rules for recording and evaluating responses . . . . The reason (for objective recording and evaluation of responses) is, of course, to minimize the influence of irrelevant personal and environmental variables on test scores (p. 3).

Although in theory, validity, reliability, and objectivity are treated separately, in practice there is some interdependence among them. Saupe (1961) noted: "Validity depends, in part, upon reliability, which in turn depends, in part, upon objectivity" (p. 449). Fox (1969) commented:
Reliability is essential for a procedure before its validity can be considered, and the actual reliability sets the ceiling for the maximum validity the instrument can possess . . . while reliability sets the limit on validity, it is absolutely no guarantee of it (p. 367).

Related Research Conducted at Iowa State University

Research in clothing construction

The first of a series of studies on placement tests in textiles and clothing at Iowa State University was conducted by Saddler (1945). The purpose of this study was to develop a test which could be used to section students into homogeneous groups in the elementary clothing construction courses at Iowa State University.

Saddler (1945) used the following instruments as predictive measures: 1) a paper-and-pencil objective test which she prepared for the purpose of determining the extent of information the students had acquired prior to enrollment in the course (p. 7), 2) a practical test consisting of the construction of a half-scale half-blouse, the purpose of which was to identify the level of each student's competency in clothing construction (p. 8), and 3) an experience questionnaire to determine the extent of clothing construction experience each student had prior to enrollment (p. 17). The participants in the study were 125 students enrolled in the elementary clothing construction course in Spring quarter, 1945.

At the end of the third week of class on the basis of the teachers' judgments of abilities and accomplishments, each student was placed in one of five sections. The teacher based her judgment on a comparison of the competencies and accomplishments of each student with those of former
students. The teachers' judgments and the course grades were used as criterion measures.

The experience score for each student was based on the number of garments constructed. Weights were assigned based on the number of garments constructed and "the amount of supervision under which they were made" (p. 33). No consideration was given to quality of construction nor was distinction made between types of garments.

The reliability of each of the predictive measures was established by using the split-half method corrected by the Spearman-Brown Formula. Intercorrelation of the scores of the predictors showed positive but low relationship between any two of the measures. The coefficient of predictive validity of each of the measures was found to be too low for any one of them to be used alone for prediction. Regression equations were developed and tested to discover which instrument or combination of instruments would give the best prediction. Saddler (1945) found that the paper-and-pencil test together with the practical test gave better results than either test alone (p. 38). The experience score was not sufficiently valuable to be useful for prediction (p. 39).

The Saddler paper-and-pencil test and practical test were used at Iowa State University for sectioning students in the beginning clothing construction course. Placement was made on the basis of regression equations using the scores from the two tests. Because the practical test was difficult to administer and score, Evans (1947) conducted research at Iowa State University to determine if a mechanical aptitude test or some combination of tests could be validly substituted for the practical test.
Evans (1947) used the following variables for predictors:

High school averages and the scores from the American Council on Education Psychological Examination for College Freshmen, the Minnesota Paper Form Board Test, the O'Connor Finger and Tweezer Dexterity Tests, and the Saddler clothing construction test (p. 2).

Participants in the study were 110 students enrolled in elementary clothing construction in Spring quarter, 1947.

The criterion measure used by Evans (1947) was the score from the final examination which was a clothing construction problem. Based on the coefficient of correlation she concluded that there was an acceptable relationship between the criterion variable and each of the following tests: 1) the Minnesota Paper Form Board Test, 2) the O'Connor Finger Dexterity Test, 3) the Saddler paper-and-pencil test, and 4) the Saddler practical test (p. 16). The scores on these tests were used in developing regression equations. Analysis of variance of four combinations of these test scores showed that the best combination was the Saddler paper-and-pencil test and the O'Connor Finger Dexterity Test. Evans concluded that the Saddler practical test "could be eliminated without serious loss" (p. 30). She found also that the final examination score showed a slightly higher correlation with the paper-and-pencil test than with the practical test, which was the reverse of what Saddler (1945) found using teacher judgment as a criterion measure (p. 17).

Scholtes (1948) continued the investigation into the possibility of finding a test or combination of tests that could replace the Saddler practical test and result in better prediction than was achieved by Evans (1947) using the O'Connor Finger Dexterity Test. She also examined the possibility of finding a relationship between sewing achievement and other
activities which involved the use of the fingers. Participants in the study were 118 students registered for the elementary clothing construction course in Winter quarter, 1948.

After analyzing the Saddler practical test to identify finger motions involved in it Scholtes (1948) selected the following tests for use in her study: "the O'Connor Finger Dexterity Test, the Minnesota Spatial Relations Test (Speed and Error Sections), and 3) the Minnesota Rate of Manipulation Test (Placing and Turning Sections) . . . ." (p. 8). She also used the Saddler paper-and-pencil test, the Saddler practical test, and a dexterity background questionnaire which she developed. The items on the dexterity background questionnaire sought to identify the amount of experience students had in typing, playing musical instruments, and sewing. Weights were assigned on the basis of the number of years of experience in each skill.

The criterion measure used by Scholtes (1948) was the score on the final examination which was a clothing construction problem. The scores of all predictors were intercorrelated and the scores on the criterion variable were correlated with the scores on each predictor. Scholtes obtained a lower correlation between the criterion scores and the scores on each of the Saddler tests than Evans (1947) did in her study. She also obtained a lower correlation between the O'Connor Finger Dexterity Test and the Saddler paper-and-pencil test than that reported by Evans.

Scholtes (1948) developed regression equations using scores on the paper-and-pencil test alone, and scores on the paper-and-pencil test in combination with each of the other tests. Analysis of variance was computed using the scores on the paper-and-pencil test in combination with
She found the best prediction of clothing construction achievement resulted when she used the combination of the Saddler paper-and-pencil test, the Minnesota Spatial Relations Test (both sections), and the finger dexterity questionnaire (p. 32). She also found, as did Evans (1947), that the practical test "could be eliminated without serious loss" (p. 32).

Following the study conducted by Scholtes (1948), the Minnesota Spatial Relations Test, the Saddler paper-and-pencil test, and the finger dexterity questionnaire formed the battery of instruments used for the sectioning of students in the elementary clothing construction course at Iowa State University. The Minnesota Spatial Relations Test was found expensive to use. Also, changes occurred in the content of the course and in the method of teaching. Because of these conditions Patson (1952) conducted research to test the effectiveness of the placement instruments with a view to improving them. Specifically, she examined and made necessary revisions in the paper-and-pencil test, examined and revised the weighting of the items on the finger dexterity test, and sought an effective substitute for the Minnesota Spatial Relations Test.

Item analysis of both the paper-and-pencil test and finger dexterity questionnaire was made for 175 students who had been properly placed in Sections X, Y, or Z according to the judgment of teachers. The students who received low scores were placed in Section Z, those with high scores were placed in Section X, while the students in the middle scoring group were placed in the Y Section. Revisions were made in the paper-and-pencil test. Several items were added which pertained to clothing construction procedures which had been introduced into the course. Based on the results
of the item analysis of the finger dexterity questionnaire, the weights for the individual items were adjusted.

Four spatial relations tests which seemed to test aptitudes similar to those tested by the Minnesota Spatial Relations Test were tested for possible substitution. These were: the Case Survey of Space Relations Ability, the Revised Minnesota Paper Form Board Test, and the Miller Survey of Object Visualization Test (p. 22). The Bennet Space Relations test was added later (p. 23). The criterion measure used was the score on the final examination which was a clothing construction problem. The participants in the study were 142 students enrolled in elementary clothing construction in Spring quarter, 1952.

Intercorrelations were calculated among all variables. The Case Survey of Space Relations Ability Test and the Revised Minnesota Paper Form Board Test were dropped because their correlations with the criterion variable were too low. Another intercorrelation was calculated resulting in the elimination of the Bennet Space Relations Test. The correlations of the revised Saddler paper-and-pencil test and the finger dexterity questionnaire with the criterion measure were lower than those found by Scholtes (1948, p. 39).

Because Patson (1952) believed that linear discriminant functions were more accurate than a regression equation for prediction purposes, she used them for classifying students (p. 40b). Patson recommended further study and the use of the final grade along with teachers' judgments regarding correct placement as criterion measures. Because the Miller Survey correlated satisfactorily with other predictors and the
criterion measure, it was recommended as a substitute for the Minnesota Spatial Relations Test.

Changes in course objectives and content, revisions in core curriculum requirements, and the introduction of an experimental plan for both the high Section (X) and the low Section (Z) of the elementary clothing construction course prompted Nieman (1961) to conduct further research on the battery of instruments in this new situation. She also examined the predictive value of individual items on the finger dexterity test developed by Scholtes (1948). The instruments used by Nieman included: 1) the revised Saddler paper-and-pencil test (Patson, 1952), 2) the Miller Survey of Object Visualization Test, and 3) the Finger Dexterity Background Questionnaire (p. 27). Nieman used the key for scoring the finger dexterity background questionnaire which was developed by Scholtes (1948).

Scores on the three measures along with scores on individual items of the finger dexterity questionnaire were the predictors used. Participants in the study were 234 students who had completed the course during the three quarters of 1959-1960, who had been properly placed as determined by prediction scores, and on whom test results were available. Criterion measures used were the final course grade, instructor's opinion of the best placement of each student, and the student's opinion of her best placement. Because of different treatments in the three sections, each section was analyzed separately.

Intercorrelations among criterion and predictor scores led Nieman to conclude that for best prediction...

... the Finger Dexterity Background Questionnaire was weighted too highly in relation to the Miller and the Saddler tests. This may be due to the fact that the Finger Dexterity Background
Questionnaire by Scholtes... was used rather than the revised form used by Patson (p. 45). Nieman (1961) recommended that "a study be made of the weightings assigned to each part of the test battery in order to give better prediction" (p. 45). The Miller and Saddler tests correlated more highly with final course grades than did the finger dexterity questionnaire. It was concluded that the tests were better for predicting course grades than was the finger dexterity questionnaire. There was low correlation between scores on the finger dexterity questionnaire and teacher opinion of best placement as well as between finger dexterity scores and student opinion of best placement. Nieman concluded that opinion of best placement was not dependent on dexterity.

Intercorrelations among predictor variables indicated that the Saddler and Miller tests were measuring some of the same type of information, while the finger dexterity questionnaire yielded a different type of information. Correlation among criterion measures showed that the highest correlation occurred between instructor's opinion and course grade. This was an indication that some of the same type of information was measured by both. There was also a high correlation between course grade and student opinion.

Six items of the finger dexterity questionnaire were correlated with all criterion scores and predictor scores to determine the predictive value of each item. The number of years of sewing experience was analyzed separately as well. Experience with playing musical instruments, typing, and previous sewing experience correlated highly with the total score on the finger dexterity questionnaire. It was concluded that these three
items were most valuable in determining the finger dexterity score. There was no significant relationship among items, indicating that they were six independent items. The amount of previous sewing experience seemed to be the most influential factor in determining the student's opinion of her best placement. Nieman suggested that different weights be given to the items of this questionnaire.

Following Nieman's (1961) research the elementary clothing construction course at Iowa State University was eliminated and two courses in flat pattern making and clothing construction, Textiles and Clothing 123 and 125, were introduced. Textiles and Clothing 123 was offered for students who had little or no previous experience in clothing construction and carried one credit more than Textiles and Clothing 125 (Vermilyea, 1967, p. 3). It was expected that students completing both courses would have comparable knowledge of basic clothing construction and pattern making principles and be equally well prepared for the advanced course, Textiles and Clothing 225. Vermilyea (1967) conducted research to determine if this expectation was justified.

In order to determine the comparability of the two courses, Textiles and Clothing 123 and 125, Vermilyea (1967) used as predictors placement test scores and final course grades in Textiles and Clothing 123 or 125 and 225. Criterion measures were garment scores and scores on a rating scale to measure the quality and consistency of student performance in class. Content validity of the garment score sheets was established on the basis of the judgment of five members of the Textiles and Clothing faculty. To estimate the reliability of the score sheets the instructor of each section of Textiles and Clothing 225 scored some of her students' garments.
Vermilyea scored all the garments and found that correlations between mean scores she assigned and those of each of the instructors yielded coefficients of .848 and .922 (p. 30).

The participants in the study were 36 students enrolled in Textiles and Clothing 225 during Fall quarter, 1966. Interviews were conducted with seven members of the Textiles and Clothing faculty to obtain their opinions about the adequacy of the preparation of students in the area of clothing construction.

Each of the two instructors of the course scored the garments of the participants who were in her class. Vermilyea (1967) scored all garments and obtained coefficients of correlation of .9187 and .8352 between her scores and those of each of the other judges (p. 39). The rating sheets were used from the third week of class throughout the quarter.

Coefficients of correlation were obtained between pairs of variables found to be related as shown on scattergrams constructed. Vermilyea (1967) found little relationship between placement test scores and scores on rating sheets (p. 49), placement test scores and dress scores (p. 50), dress scores and final course grades in Textiles and Clothing 225 (p. 54), placement test scores and final course grade in Textiles and Clothing 225 (p. 56), and final course grades in Textiles and Clothing 123 or 125 and final course grades in Textiles and Clothing 225 (p. 58). A positive relationship (.739), significant above the .01 level, was found between scores on the rating sheet and final course grade in Textiles and Clothing 225 (p. 54). A positive relationship (.40), significant at the .05 level, was found between dress scores and scores on the rating sheet (p. 53).

Vermilyea (1967) commented that in her study no information was
obtained from students and suggested that in further study this be done. Opinions of the seven instructors interviewed were too variable for Vermilyea to make recommendations pertinent to course changes. She concluded that the faculty thought that students who completed Textiles and Clothing 123 or 125 were adequately prepared for Textiles and Clothing 225. Approximately one-half of the interviewees indicated that a preliminary course in clothing construction would be helpful.

Shaw (1971) undertook the task of evaluating and revising the instruments used for placement. This study was necessitated by changes which had occurred in the use of the placement instruments and in basic clothing construction courses. The students who obtained low scores on the placement test were placed in Textiles and Clothing 123 in which the instruction was divided between clothing construction techniques and flat pattern making. Because instructors believed that the students with less experience were "penalized because they did not have a useable understanding of clothing construction before receiving instruction in flat pattern making" (p. 1), Textiles and Clothing 123 was eliminated. A new course, Textiles and Clothing 121, was introduced in Fall quarter, 1969, to provide students who had little or no previous experience the opportunity to learn basic clothing construction before being exposed to flat pattern making. Students were then assigned to either Textiles and Clothing 121 or 125 on the basis of placement test scores.

Shaw (1971) in her study did not use the Miller Survey of Object Visualization because its content was considered to be more relevant to flat pattern making than to basic clothing construction. The finger dexterity background questionnaire was administered but not scored; it
was used to guide students with borderline scores on the paper-and-pencil test into the appropriate course (p. 20). The revised Saddler paper-and-pencil test (Patson, 1952) was the only predictive instrument used. It was tested and revised to meet the changes in content in the basic clothing construction course following a study of the objectives of both Textiles and Clothing 121 and 125. Shaw added to the test items which tested knowledge and application of basic principles in relation to fabric and design.

The revised test was administered to 229 students in Summer quarter, 1970. The results were analyzed and further adjustments were made in the test. In Fall quarter, 1970, the test was administered to 51 students who were placed in either Textiles and Clothing 121 or 125. Analysis of test scores showed that there was some improvement in the number of discriminating items, a higher average item difficulty, but a lower reliability coefficient than found in the first administration (p. 34). The reliability coefficient, .84, was considered acceptable but a higher one would have been preferred because the test alone was used for prediction (p. 35). On the basis of the results of this item analysis Shaw suggested that further testing and revision be done to improve the effectiveness of the test.

Student reaction to placement was obtained by means of a questionnaire developed by Shaw (1971). Information was obtained also regarding the extent of background experience students had prior to enrollment in either Textiles and Clothing 121 or 125. Results showed that students enrolled in Textiles and Clothing 125 had more instruction on the average and had constructed more garments than did those students in Textiles and Clothing 121 (p. 29).
The following null hypotheses were tested by Shaw (1971):

1. Students varying in high, middle and low scores on the Textiles and Clothing Placement Test did not differ significantly in their quality of construction in garments produced.

2. Students exposed to two different clothing construction courses did not differ significantly in the quality of construction found in the garments they produced (p. 3).

Criterion measures used in this study were scores on garments constructed by the students as well as category placement of the garments. Category descriptions were excellent, average, and poor. Fifteen judges participated in the scoring, each evaluating three or four garments and checking the scores of one other judge. Where there was disagreement between judges, a third judge was used.

Students were classified into three groups, high, middle, and low, using the scores on the paper-and-pencil test. An analysis of variance for the three groups using categorization of garments as excellent, average, and poor, showed that there was significant difference at the .05 level among low, middle, and high groups (p. 39). On the basis of garment quality the first hypothesis was rejected.

An analysis of variance of mean garment scores was computed for the three groups. The results showed that there was no difference among groups based on garment scores (p. 40). On the basis of garment scores the first hypothesis was not rejected. Shaw suggested the following reasons why no difference was found among groups on this aspect: 1) inconsistency of judging, 2) different project requirements in the two courses, and 3) choices of more difficult fabric by some students. She recommended that further study be done using as criterion measures the scores on garments with equivalent difficulty and similar fabrics.
To test the second hypothesis Shaw used only the middle group of test scores which included students placed in both Textiles and Clothing 121 and 125. Results of the analysis of variance of category placement and mean garment scores showed that there was no difference among the scores of the students in the middle group. The hypothesis was not rejected (p. 43). Shaw concluded that similar knowledge of basic clothing construction was acquired by students upon completion of each of the courses.

Croft (1959) adapted the instruments developed at Iowa State University for prediction of achievement of high school pupils. She used the Saddler paper-and-pencil test, the finger dexterity background questionnaire, and the Miller Survey of Object Visualization Test (p. 12).

Research methodology

Although the following research report does not deal with clothing construction, it was considered to be pertinent to the present research because of the methodology used. A large number of predictors and criterion measures was used in the study, and the statistical treatment of the variables in deriving prediction formulas was considered relevant to the present study.

At Iowa State University, Crabtree (1965) conducted research to investigate the value of certain predictors for predicting the effectiveness of first year homemaking teachers. Her project was part of a continuing study to identify effective teachers among applicants for the home economics teacher education program.

Crabtree (1965) used 34 predictor variables, 17 dealing with personality traits, three dealing with vocational interest, 13 dealing
with attitudes toward other people, and the grade point average reflecting academic achievement. Criterion measures of teacher effectiveness were: two forms of student estimate of teacher-pupil rapport, four forms of achievement tests identifying pupil gain in ability to apply generalizations in solving problems in home economics, and four factors rated by school administrators dealing with a teacher's adjustment to school and community. Data were obtained from three groups of first-year homemaking teachers in Iowa (a total of 64) who had graduated from Iowa State University.

Because there was a large number of predictors and criteria, and a small number of cases, Crabtree (1965) used "an adaptation of the J-coefficient procedure to obtain prediction formula weights for the variables" (p. 85). A panel of eight judges, members of Iowa State University faculty from Home Economics Education, Education, and Psychology, rated predictors in terms of importance for predicting teacher effectiveness. They also rated the criteria in terms of importance for determining teacher effectiveness. Intercorrelations among judges' ratings resulted in the elimination of the ratings of two judges for the predictors and the ratings of three judges for the criterion measures (p. 88).

Weights assigned each variable were determined by dividing the standard score mean of the judges' responses by the standard deviation for the variable for a particular group of teachers. Composite scores for both the predictors and the criterion measures were obtained by adding the weighted scores. Low correlations were found between the composite criterion score and predictors dealing with personality traits and vocational interest. These predictors were eliminated and a new composite
predictor score was calculated and correlated with the composite criterion score (p. 126). Correlations were significant for Groups 1 and 3 beyond the .01 level and for Group 2 beyond the .05 level (p. 126). The multiple correlation coefficient "obtained for the regression equation in each group was too low to predict individual success" (p. 127).

Crabtree (1965) also correlated specific predictors with the composite criterion score. She found significant correlation between the composite criterion score and four personality predictors, satisfactory correlation between composite criterion score and 1) academic achievement, 2) seven subscores on attitudes toward other people, and 3) the total score on attitude toward other people (p. 127).

Crabtree (1965) recommended that in subsequent research a larger panel of judges be used. She also suggested that sample items from the instruments be added to the definition of variables on the rating form.

Related Research Conducted at Other Universities

At Illinois State Normal University, Johnson (1953) conducted research to identify the nature and extent of precollege experiences in clothing construction in an effort to discover the value of these experiences for placement and for curriculum adjustments in the beginning course in clothing construction. She used two paper-and-pencil pretests, a background experience check list, and a practical pretest "to evaluate the achievement of students entering college clothing classes . . ." (p. 8). Placement in two different courses was made on the basis of the total scores on these instruments and curriculum changes were made to adjust for
variation in student experience and abilities as identified from the pre-instruction measurement instruments.

Coefficients of reliability were obtained using the split-half method corrected by the Spearman-Brown Formula. The coefficients for the pre-tests were .92 for the test dealing with knowledge of principles (p. 14), .95 for the test dealing with problem-solving (p. 21), and .86 for the practical test (p. 23).

To determine the effectiveness of the instruments as predictors, Johnson (1953) readministered the paper-and-pencil tests after the completion of the courses. She compared scores on the pretest and retest, reported the range of scores, mean scores, variance and mean gain, and concluded, "Retesting is a satisfactory medium of evaluating classification and placement of students in beginning college clothing courses" (p. 74). Although she did not use garment scores as criterion measures, she did compare total scores on garments with total scores on the practical pretest and concluded, "From these data it appeared that there was a general increase in construction ability" (p. 68).

Johnson (1953) found that previous experience in clothing construction contributed to both paper-and-pencil and practical achievement in the college clothing construction courses. Clothing construction experience at the high school level contributed more to achievement in the college courses than did experiences in a 4-H program or home sewing.

Hoskins (1959) conducted research for the purpose of developing a pretest for use in the elementary clothing construction course in five universities and colleges in New Mexico. To identify objectives that were common to the five universities, she developed a questionnaire for
clothing faculty to express the extent of emphasis placed on certain basic principles. From the responses of these faculty members she devised a list of generalizations which was evaluated by a group of university faculty members and others working in the field of home economics. After revision, the list of generalizations was used as a "guide to areas to be tested and the amount of emphasis in each area" (p. 22).

The three areas tested in the paper-and-pencil test were "Principles of Art as Applied to the Completed Costume, Principles of Pre-Construction Processes, and Principles of Construction Processes" (p. 22). The test was administered to students in schools of New Mexico. Scores on tests of students whose experiences in clothing construction matched those of the students who enrolled in the elementary clothing construction courses in the five universities and colleges were used for analysis.

Analysis of test results included a reliability estimate of .717 (p. 104) computed according to the Kuder-Richardson Formula 20, means and standard deviations of the scores for the total number of students tested, and item analysis. Hoskins (1959) concluded "that the test is valid and reliable as evidenced by the test results" (p. 120). She recommended that: 1) the test be used for diagnostic purposes and 2) a practical test be used in conjunction with the paper-and-pencil pretest for exemption purposes and for placement.

Research in clothing construction was conducted by Witt (1961) at Oklahoma State University and Mississippi State College for Women. The participants were 112 freshman students enrolled in beginning clothing construction in both institutions. The purpose of this project was to revise the paper-and-pencil test in use at Oklahoma State University and
to develop a practical test to evaluate specific clothing competencies of students in the beginning clothing construction course.

Witt (1961) identified 10 objectives which were common to the clothing construction courses in the secondary schools of Mississippi and Oklahoma and to the two universities. From these objectives she formulated generalizations for the purpose of selecting test items for each measurement device. The instruments used were the revised Oklahoma State University paper-and-pencil test, a background experience questionnaire, and a practical test. The following clothing areas were examined: clothing selection, clothing care, and clothing construction. The instruments tested the students' knowledge of principles, ability to apply principles, and manipulative and judgmental skills in the specific competencies.

Using the Kuder-Richardson Formula 20, Witt (1961) found a reliability coefficient of .74 for the written test (p. 104), and a reliability coefficient of .58 was obtained for the practical test using the split-half method and the Spearman-Brown Prophecy Formula (p. 145). The practical test involved manipulative and judgmental skills. The reliability coefficient of the portion dealing with manipulative skills was .66 (p. 121) and for judgmental skills, .29 (p. 136).

Witt (1961) found that a score on one competency does not necessarily correlate highly with the score on another (p. 153), nor does knowledge of principles ensure ability to apply principles or to make judgments. She found also that there was a lack of consistency between previous clothing experience and scores students made on the written and practical tests.

Berry (1963) conducted research at Oklahoma State University to revise the clothing pretest developed by Witt (1961). Revisions were made
following an examination of course objectives and a trial administration of the pretest in Fall semester, 1962. Berry added five practical problems to the pretest to determine if there was a relationship between comprehension and application of certain principles.

The revised instrument and the Nelson-Denny Reading test were administered to 76 students enrolled in beginning clothing construction in Spring semester, 1963. The Nelson-Denny Reading test was administered to determine if a relationship existed between reading rate and comprehension and performance on the pretest. "It was theorized that students with above average reading skills would perform better on the pretest than those students exhibiting poorer reading skills" (p. 49).

Berry (1963) found from the item analysis of the pretest that 64 percent of the items had satisfactory difficulty levels between 70 and 40 (p. 52). No reliability coefficient was reported. Correlation of rank on the original pretest and rank on the revised test showed a significant positive relationship, but "a high rank on the original did not assure a student a position of similar rank on the revised instrument" (p. 48). A coefficient of correlation of .29 was obtained between the total score on the five practical items and the score on the items of the written test dealing with the same principles (p. 48). Berry (1963) concluded that there was little relationship between comprehension and practical ability in applying principles. A coefficient of correlation of .21 was obtained between scores on the pretest and scores on the Nelson-Denny Reading test (p. 51).

Although the pretest was not used as a predictor of performance in the course, a correlation of .44 indicated that there was some relationship
between pretest scores and final course grade (p. 50). Berry (1963) recommended further revision to improve the discriminating power of the test items. She suggested also the addition of more items of the practical type.

Marshall (1967) developed a pretest to determine the status of students enrolled in beginning clothing construction at the University of Tennessee. She also investigated the "contribution of the American College Test (ACT) score, past experience index, reading score and object visualization score in evaluating potentialities of students in beginning clothing construction" (p. 4).

Items for the pretest were based on objectives of the clothing construction course. Class tests administered at the University of Tennessee, tests from other universities, and basic clothing construction texts were used in the development of the items. The test was revised following review by members of the Textiles and Clothing Faculty and a trial administration in Summer session, 1966.

Participants in the study were 70 students enrolled in the beginning clothing construction course at the University of Tennessee in Fall and Winter quarters, 1966-1967. An experience list was developed which obtained information about previous experiences students had with certain clothing construction processes. Scores were assigned responses and a single score was obtained for each student (p. 29).

The reliability coefficient of the test was .89 (p. 44). Item analysis results were reported. On the basis of test results those with low scores were assigned to an extra laboratory session. The effectiveness of the assignment was determined by the opinion of teachers with
regard to best placement. Marshall (1967) found that teachers agreed with the assignment (p. 45).

The pretest was administered as a posttest. Mean gain and the highest and lowest gains were reported (p. 46). Marshall (1967) found that students who had low scores on the pretest obtained a higher difference score than those with high scores on the pretest (p. 46).

Correlations between the pretest scores and the score on each of the other instruments used indicated that there was a positive relationship, significant at the .01 level, between the pretest scores and 1) the experience index ($r, .6393$) and 2) the Miller Object Visualization scores ($r, .4750$). There was a positive relationship, significant at the .05 level, between the pretest scores and 1) ACT ($r, .2564$) and 2) reading score ($r, .2746$) (p. 77).

At Ohio State University, Caudill (1968) adapted the pretest and experience questionnaire developed by Marshall (1967). The pretest was revised after comparison of course content of the course offered at Ohio State University with that offered at the University of Tennessee and after a trial administration in Winter quarter, 1968.

Caudill (1968) hypothesized that there would be a positive relationship between scores on the pretest and background experience. The following information obtained from an item analysis of the pretest was reported. Using the Kuder-Richardson Formula 20, a reliability coefficient of .90 was obtained (p. 50). There were 34 of the 100 items which had both the acceptable difficulty index and index of discriminating power (p. 53). The correlation of the pretest scores and scores on the experience index yielded a coefficient of .63 (p. 49), and the correlation of pretest
scores and scores for the number of years of previous clothing construction experience yielded a coefficient of .71 (p. 49). Caudill concluded that "it would seem that there is a relationship between pretest scores and the amount of previous experience of a student in clothing construction thus supporting the hypothesis of the study" (p. 49).

Semeniuk (1961) conducted research at South Dakota State College for identification of students' strengths and weaknesses, for classification, and for curriculum planning. She developed a questionnaire to obtain information about the kind and extent of background experience the students had and about the students' reactions to the course. The items on the pretest were based on the objectives of the beginning clothing construction course and they tested knowledge of facts, comprehension, and application of principles. Participants in the study were 80 students who took the clothing course in Winter quarter and Spring quarter, 1960-1961.

The content validity of the test was established by comparison of the pretest scores with the extent of experience students had. Semeniuk (1961) found that the test had some degree of validity in "reflecting students' past clothing experience . . ." (p. 43). The reliability coefficient of the pretest, calculated by the Kuder-Richardson Rational Equivalence Formula, was .70 (p. 27).

Criterion measures used were retest scores, garment scores, scores on written tests during the course, and final course grade. The coefficient of correlation between pretest scores and retest scores was .53 (p. 32). When pretest scores were plotted against retest scores, two distinct groups were identified. Group A showed higher gains on the retest than
Group B (p. 32). The coefficient of correlation between pretest scores and retest scores for Group A was .85 and for Group B was .88 (p. 32). The coefficient of correlation between pretest scores and scores on written tests was .47, between pretest scores and garment scores was .42, and between pretest scores and final course grade was .52 (p. 32).

Students' responses to questions about the level of the course showed that the majority of the participants found it challenging. They said also that they learned a great deal and had a favorable attitude toward sewing.

Semeniuk (1961) found that the pretest was "helpful to students in giving them a preview of the course, in revealing their strengths and weaknesses, and was helpful to the instructor in meeting the needs of the students through more personalized attention" (p. 44). She recommended using the pretest together with a practical test for classification of students.

Rothgarn (1962) conducted research at Michigan State University to develop a paper-and-pencil pretest to determine the ability of students to comprehend and apply principles of clothing construction. She developed a student background questionnaire to obtain information about clothing construction experience of students prior to enrollment in the elementary clothing construction course. Items on the paper-and-pencil test were based on the course objectives and stated principles. Two forms of the test, form A and form B, were constructed. Revisions of both forms were made following a pilot study involving 22 home economics students enrolled at Western Michigan University. Participants in the study were 82 students.
enrolled in the basic clothing construction course at Michigan State University.

Item analysis on both forms of the test yielded the following information: 38.37 percent of the items on form A and 43.04 percent of the items on form B were within the acceptable difficulty range of 30-70 (p. 39); the reliability coefficients, using analysis of variance technique, were .734 for form A and .732 for form B (p. 40); there were six items on form A and five items on form B that were not discriminating (p. 39).

Scores were categorized according to the cognitive level of items. Correlations between form A scores and form B scores on 1) items dealing with comprehension yielded a coefficient of .53, 2) items dealing with application yielded a coefficient of .70, and 3) all items yielded a coefficient of .72 (p. 41).

The criterion measure used by Bothgarn (1962) was the final course grade. Correlation coefficients obtained between course grade and 1) comprehension score on form A was .51, 2) application score on form A was .52, 3) comprehension score on form B was .39, 4) application score on form B was .50, and 5) total score on form B was .45 (p. 43).

The number of dresses constructed by students prior to enrollment was correlated with dress score and yielded a coefficient of .40 (p. 46). The level of clothing construction ability identified by the students was compared with the final course grade giving a correlation coefficient of .44 (p. 46). Bothgarn (1962) suggested that these results were inconclusive, but information obtained from the student questionnaire was valuable to the instructors (p. 47).
Rothgarn (1962) recommended further study to improve the instruments and to investigate the possibility of using them for classification and for exemption. She suggested also that a device be developed for identifying clothing construction skills of students prior to enrollment.

Epps (1972) conducted research at Winthrop College to develop instruments for the purpose of determining preinstructional experiences in clothing construction. The information obtained was to be used in planning individualized instruction for students in the basic clothing construction course. Participants in the study were 54 students enrolled in the course in Fall and Spring semesters, 1971-1972. The predictive instruments used were a practical pretest, a written pretest, and a clothing construction experience questionnaire. Criterion measures were scores on a written posttest and course grades.

Results of the study showed that the written pretest alone was an effective predictor of success in the course as measured by posttest scores and course grades. A reliability coefficient of .72 was obtained for the written test.
PROCEDURE

As stated previously, the objectives of this research project were:

1. To describe the clothing construction segment of beginning clothing courses at all universities located in the Maritime Provinces of Canada where degree programs in home economics are offered

2. To adapt and to test the reliability and predictive validity of predictive measures for use in placement of students in elementary clothing construction

3. To provide a basis for recommending adjustments for individual differences among students in elementary clothing construction for universities in the Maritime Provinces of Canada.

Procuring Cooperation of Maritime Universities

A list of universities located in the Maritime Provinces of Canada and offering degree programs in home economics was procured from the Canadian Home Economics Association. These universities were:

Acadia University, Wolfville, Nova Scotia
Mount St. Vincent University, Halifax, Nova Scotia
St. Francis Xavier University, Antigonish, Nova Scotia
University of Moncton, Moncton, New Brunswick
University of Prince Edward Island, Charlottetown, Prince Edward Island

The chairman of the home economics department in each of these universities was contacted by letter and asked if she would permit the instructors of the elementary clothing course to participate in this research project.
A self-addressed, stamped envelope was included as well as an instrument for responding to this request and for supplying the following information: the name of the instructor(s) of the elementary clothing course and the time the instructor(s) would be available for a personal meeting with the researcher. A copy of the letter and response form is included in Appendix A. All five chairmen who were contacted expressed willingness to cooperate and provided other information requested.

Description of Sample

This research project was designed for the purpose of developing and testing instruments. The target population was all the students who would enroll in the future in the elementary clothing courses in the universities of the Maritime Provinces of Canada which offered degree programs in home economics. The population on which data were collected was all students enrolled in the elementary clothing courses in these universities in 1972-1973. Because data were collected from all the students in the population a 100 percent sample, or census, for one year was used.

In the home economics degree programs offered in the universities of the Maritime Provinces of Canada clothing construction is offered as a segment of the elementary clothing course. Other areas included in the course are social and economic aspects of clothing and design principles.

Development of Instruments

Because this research was conducted in several universities it was necessary to determine the comparability of offerings in elementary clothing construction. Instruments were developed for the purpose of
obtaining information on which comparisons could be made. These were: 1) a course objectives questionnaire for instructors, 2) an interview questionnaire for instructors, and 3) a course evaluation questionnaire for students to identify problems they had experienced with clothing construction.

One of the objectives of this research project was to obtain a test which could be used for placement of students and for prediction of their performance in the elementary clothing construction classes. Instruments were developed for this purpose. These predictive instruments were: 1) a paper-and-pencil objective test based on principles of clothing construction and 2) a student background experience questionnaire which included items dealing with finger dexterity background experience.

In order to evaluate the effectiveness of the predictive instruments the following instruments were used as criterion measures: 1) score sheets for evaluating garments constructed by students during the course, 2) the paper-and-pencil test administered as a posttest, and 3) the course evaluation questionnaire mentioned above.

Course objectives questionnaire

In order to determine if the objectives for the elementary clothing construction classes offered in the participating universities were comparable enough for one placement test to be used for all, a questionnaire was developed for the instructors of these classes. This was used in conjunction with the course evaluation questionnaire and the posttest. The purpose of the questionnaire was to obtain the judgment of each of the instructors regarding: 1) the degree of emphasis placed on the
comprehension of the principles of clothing construction included in the objectives of the elementary clothing construction classes at the university and 2) the degree of emphasis placed on the provision of opportunity for students to apply these principles in the construction of garments. A copy of this questionnaire is included in Appendix B. As used in this questionnaire and in the course evaluation questionnaire discussed later, the term, comprehension, includes "those objectives, behaviors, or responses which represent an understanding of the literal message contained in a communication" (Bloom et al., 1965, p. 89). The term, application, refers to practical performance incorporating both the cognitive abilities defined by Bloom et al. (1965) as application, "the use of abstractions in particular and concrete situations" (p. 205), and motor abilities involved in the construction tasks.

A list of objectives was formulated based on the principles involved in a college elementary clothing construction course and corresponding to the items of the placement test used. Two spaces were provided beside the statement of each principle for the instructors to register responses. The first space was provided for response regarding the degree of emphasis placed on the comprehension of the principle. The second space was for identifying the degree of emphasis placed on providing the opportunity for students to apply the principle during the course. A rating scale, with instructions for registering responses, was devised. This scale was a 9-point certainty scale where number 1 was used to indicate certainty that the objective was not emphasized, number 5 indicated uncertainty whether the objective was emphasized or not, and 9 indicated certainty the
principle was emphasized. Interpretation of intervening numbers is given in the course objectives questionnaire in Appendix B.

**Instructor interview questionnaire**

An interview questionnaire was developed for the instructors. The purposes of this instrument were: 1) to obtain additional information about elementary clothing construction offerings in each university as a basis for making further judgment regarding the comparability of courses, 2) to obtain the judgment of the instructors regarding content validity of the placement test, and 3) to obtain the judgment of each instructor regarding the necessity for, or the feasibility of, using a placement test for elementary clothing construction. This questionnaire was administered by the researcher during the first meeting with each of the instructors participating in this project. A copy of this questionnaire is included in Appendix C.

**Paper-and-pencil test**

A major objective of this research project was to develop or select instruments which could be used for placement purposes and for prediction of performance of students enrolled in the elementary clothing construction classes in the five universities participating in this study. Because of the time and amount of work involved in developing and testing such research instruments, a search was made for instruments which had been developed, tested, and found to have content and criterion-related validity and reliability for university students in another geographic region. Such instruments had been developed in the Textiles and Clothing Department at Iowa State University (Shaw, 1971). The Iowa State University
instruments used for placement were: 1) a paper-and-pencil objective test based on principles of clothing construction, 2) a student background experience questionnaire, and 3) a finger dexterity background questionnaire. Permission to use these instruments was obtained from the head of the Textiles and Clothing Department.

The objective test contained 100 items involving different levels of cognitive behavior and requiring student responses of the true-false, multiple choice, and matching types. The items were arranged in sequence according to the procedure followed in the construction of a garment. Reliability, and content and criterion-related validity, of this test had been established for Iowa State University students.

Before the Iowa State University paper-and-pencil test (Shaw, 1971) was accepted for use in this project, the content validity for college students in the geographic region included in this study was investigated. The researcher and one other instructor of the introductory clothing course at the University of Prince Edward Island examined the test to determine if the cognitive level of behavior and the principle involved in each item were appropriate for students attending the University of Prince Edward Island. In thus evaluating the validity of the test it was assumed that the students attending the University of Prince Edward Island were representative of the students in the five universities participating in this research. Only one item was judged inappropriate, and it was dropped from the test.

Because the paper-and-pencil test was used to differentiate among students, an examination of the test items was made to determine their discriminating power and difficulty indices for students who would
participate in the research. Assuming, again, that students attending the University of Prince Edward Island were representative of the students in all the participating universities, a trial administration of the Iowa State University paper-and-pencil test (Shaw, 1971) was conducted at the University of Prince Edward Island. The participants were 30 students enrolled in the elementary clothing course in 1970-1971. An item analysis of the test was computed and studied.

Information provided by item analysis included the reliability coefficient computed by the Kuder-Richardson 20 Formula, the difficulty index of each item, the discriminating power of each item, and distractor analysis. The difficulty index was expressed as the percentage of students who responded correctly to the item. Menne (1970) suggested:

The percent correct should vary from close to zero to almost 100%. . . . However, most of the items should be of medium difficulty, that is with 30 to 70% correct (p. 8).

The discriminating power of each item was expressed as item-score correlation and had a possible range of -1.00 to +1.00. Regarding item discrimination Menne (1970) said that the higher the correlation is the better the item is, and a range of 0.20 to 0.40 is good. Further, he said, "If the correlation is very low or negative the item is poor" (Menne, 1970, p. 8). In the latter case the wording of the item should be studied to determine if it is ambiguous, and rewording or elimination of the item should be considered. The distractor analysis indicated the number of students who chose each of the possible answers. Menne's (1970) suggestion regarding distractor analysis was that "all distractors should be sufficiently plausible that at least one student in a class of about 50 students will choose each response option" (p. 7).
From the item analysis of the trial administration of the test it was found that: 1) the reliability coefficient was .70, 2) there were 28 of 314 options that were not chosen, 3) there were 16 items that had indices of discriminating power greater than .40, 35 items had indices between .40 and .20, and 49 items had indices below .20, and 4) there were 19 items with difficulty indices below 30, 66 between 30 and 70, and 15 were above 70. Items which had options that were not chosen, had unsatisfactory indices of discriminating power, or unsatisfactory levels of difficulty were examined.

Based on analysis of the test and of the judgment of the two instructors from the University of Prince Edward Island, some recommendations for adjustment of test items were made. These recommendations were then discussed with an instructor of introductory clothing construction at Iowa State University who had conducted research on the placement test. This instructor agreed with the proposed recommendations.

Items which were judged ambiguous or which had clearly no right or wrong responses were changed. These were items 35, 36, 49, 58-62, 89-92, 95, 97, and 98 on the test which is included in Appendix D. In some cases the format of the items was changed in order to clarify it. Items so changed were 4, 7-16, and 53-57 of the test. Some instructions were reworded in order to establish a uniform pattern and thus provide greater clarity and ease of response. These were items 7-21, 25-48, 62-65, and 71-95. Rewording of items was done in some cases without altering the intent of the item in order to further clarify them. Items 3, 6, 15, 24-26, 50, 56, 57, and 66 were reworded. Through all the revisions an attempt was made to retain the original test plan. When an item was eliminated, a substitute
item dealing with the same principle and requiring the same level of cognitive behavior was sought. In two instances suitable substitutes were not obtained because it seemed that there was already a sufficient number of items dealing with the two principles involved. The number of items on the revised test was 98.

A page of instructions to the students was inserted into the test. Included in this set of instructions were general directions for responding to the items using an IBM answer sheet. The form of the IBM answer sheet provided for five response options. Special directions for responding to several items were retained in the test booklet. The revised form of the test and the rationale for changes made were presented to and approved by Dr. Margaret Warning, Head, Textiles and Clothing Department, Iowa State University. A copy of the paper-and-pencil test is included in Appendix D.

Background experience questionnaire

As mentioned previously, a student background experience questionnaire was used in conjunction with the paper-and-pencil test for prediction of achievement in the elementary clothing construction course. This questionnaire was adapted from the student background experience questionnaire and finger dexterity questionnaire used at Iowa State University. The student background experience portion of the questionnaire sought information about the extent of experiences students had in clothing construction prior to enrollment in the introductory course. Specifically it sought to determine where the students had obtained previous learning experiences in clothing construction, the amount of time these experiences
involved, and the type and quantity of garments previously constructed.
The purpose of the finger dexterity experience portion of the questionnaire
was to identify the extent of experience the students had with specific
manipulative skills prior to enrollment. It was expected that students
who had previous clothing construction experience and experience with
certain manipulative skills would experience less difficulty with the
course and would achieve higher scores in the course than those with little
or no previous experience. Changes in wording and format were made in both
the background experience items and the items dealing with finger dexterity
background experience in an effort to improve clarity and ease of response.
Directions for responding to items were included and provision was made for
recording responses on the instrument. A copy of this questionnaire is
included in Appendix E.

In an effort to control errors due to test administration in the five
participating universities and to provide optimal motivation for students
to cooperate in this project, a set of guidelines was drawn up for the use
of the instructors. This set of guidelines included directions to the
instructor for administering the test as well as an explanation to be given
to the students to enable them to realize the importance of their contribu-
tion to research in this instance. A copy of the guidelines is included in
Appendix F.

Instruments for scoring garments

As mentioned previously, scores on garments constructed by the
students during the course were selected as criterion measures for the
purpose of determining the validity of the predictive instruments. Score
sheets were developed for the following garments: a skirt, slacks, and
dress (tunic or blouse). Clothing construction processes involved in each
of these garments were itemized, and details to consider in evaluating
each process were included. The list of clothing construction processes
was derived from texts on elementary clothing construction (Erwin, 1969;
Iowa Home Economics Association, 1972; Reich, 1971; Simplicity, 1972).
The details to consider in evaluating each process were derived from a
bulletin prepared for the use of 4-H instructors (Iowa State University
Cooperative Extension, 1967). A 9-point rating scale was used for scoring
each process that was included in the garment, according to the following
specifications: 1 meant the scorer was certain that the quality of con­
struction was unsatisfactory, 5 meant the judge was uncertain if the
quality of construction was satisfactory or unsatisfactory, 9 meant the
judge was certain the quality of construction was satisfactory. Further
information on the use of the rating scale is given on the direction sheet
accompanying the score sheets in Appendix G. The responses were recorded
in blanks provided to the left of the application process for the outer
portion of the garment. If a lining was constructed, responses were
recorded for the processes involved in blanks to the right of the item.
If a process was not included in the garment, the letters, "n a", were
recorded to indicate it was not applicable.

Course evaluation questionnaire

It was expected that students with little or no previous knowledge or
experience with clothing construction would encounter more difficulty with
the college elementary clothing construction course than those who had
previous learning experiences. In order to determine if a relationship existed between experience and problems encountered in the elementary clothing construction course, a questionnaire was developed for the students to respond to at the completion of the course. As mentioned previously, this questionnaire was used also to aid in determining course objectives. The students were asked to identify problems they had experienced with objectives of clothing construction, the extent to which they experienced problems, and the reasons these problems were encountered. This questionnaire contained the same list of objectives as did the course objectives questionnaire which the instructors responded to. The students were asked to identify the extent of ease or difficulty experienced with both the comprehension and the application of principles involved in each objective using a 9-point certainty scale according to the following description: 1 meant the student was completely certain the item was easy, 5 meant the student was uncertain whether the item was easy or difficult, and 9 meant the student was completely certain the item was difficult. The students were asked also to judge the extent to which clothing construction was found to be easy or difficult, the extent of learning clothing construction during the course, the extent of enjoyment of sewing, the relative importance of certain motives for continuing to sew, and the reasons for easiness or difficulty experienced in clothing construction. A copy of the questionnaire is included in Appendix H.

Construction of Sample Garments

In order to determine whether the scores given by the instructors on garments constructed by students in the participating universities would
be comparable, sample garments were constructed for all the participating
instructors to score. Three garments were constructed: a skirt, tunic,
and slacks. The skirt was made of polyester-wool blend and the tunic and
slacks were made of polyester crimp. It was believed that the garment
types and fabrics used were representative of those that would be used by
students in the elementary clothing construction course. The patterns for
these garments were selected with the objective that the major clothing
construction processes involved in a college elementary clothing construc­
tion course be incorporated. The tunic had bust-line and back shoulder
darts, a mandarin collar, set-in sleeves with buttoned cuff, an invisible
zipper in center front, and yoke and patch pockets of contrasting color.
The hem was finished with lace seam binding and vertical hemming stitch.
The slacks had an encased elastic waistband and centered zipper application
in the center back seam. The hem on the legs was finished with catch-
stitching. The skirt was an A-line style, with an overlapping zipper
application in the left side seam, a waistline facing, and lining. The
hem was finished with straight seam binding and vertical hemming stitch.

Two main objectives were followed during the construction of the
sample garments. The first was to construct the garments in such a manner
that they would be acceptable for wearing. It was believed that, in most
cases, the quality of construction of garments made by students at the
college level would be such that the general appearance would be satisfac­
tory. The second objective was to incorporate into the construction of
the garment errors considered commonly made by some or all students in a
college elementary clothing construction course. A record was kept of
the processes that were improperly performed.
Meetings with Instructors

An appointment with the clothing construction instructor in each participating university was arranged prior to the beginning of classes for the first semester of the 1972-1973 college year. During the interview the researcher explained the scope and purpose of the research project. The test booklet, student background experience questionnaire, directions for the administration of the test and questionnaire, and the course objectives questionnaire were explained. The interview questionnaire was completed with each instructor. The number of students enrolled in the elementary clothing course in each university was obtained. Sufficient copies of the test booklet, IBM answer sheets, and background experience questionnaire were left with each instructor for the students. Guidelines for administration of the test and questionnaire were also left with each instructor. Each instructor also studied the paper-and-pencil test to determine if the items represented a fair sampling of the objectives of the elementary clothing construction portion of the clothing course.

Arrangements were made for the researcher to collect all materials after the administration of the test and questionnaire. Each instructor, upon request, agreed to use the researcher's score sheets in the evaluation of garments constructed by the students during the course. It was arranged that a posttest and the course evaluation questionnaire be administered to the participating students at the completion of the course. Arrangements were made also for the instructor of elementary clothing construction, and one other clothing instructor in each university, to score sample garments at a future date using the score sheets
prepared for this research. The purpose of this was to test the consistency of scoring among universities. The researcher requested that the second clothing instructor in each university also score three of the garments constructed by the students, selected at random. This was for the purpose of testing reliability of scores within each university.

By arrangement, during the first week of October a second meeting was held with the instructor of beginning clothing construction in each of the participating universities. Because the paper-and-pencil pretest would be readministered as a posttest it was considered undesirable for the instructors to retain copies of the test and special effort was made to collect all test booklets at this time. This was done to prevent the possibility of the instruction in the course being focused on the items of the test. A source of error referred to by Cooley (1971) as a form of criterion contamination, "direct coaching on the criterion test" (p. 546), was thus eliminated. The students' scores were withheld from the instructor, also to prevent criterion contamination. Cooley (1971) said that the instructor's "knowledge of the predictor score may influence his treatment of the individual, and this in turn may influence the individual's actual criterion performance . . ." (p. 546).

At this meeting, also, the score sheets were discussed and the scoring method explained to the instructor of the clothing course and the other clothing instructor who would be scoring sample garments. Garment score sheets were left with each instructor for use in scoring garments constructed by the students.

All of the universities, except one, offered a one-semester course in introductory clothing which terminated in December. The administration
of the posttest and questionnaire was scheduled for the first week of December for four universities. During the last week of November the test booklets, IBM answer sheets, and course evaluation questionnaire were delivered to these universities. This phase of the research was completed with the fifth university in April.

Collection of Data

During the first meeting with the instructors of elementary clothing construction in each university the course objectives questionnaire and the instructor interview questionnaire were completed. In October, during the second meeting, the completed student background questionnaires and responses to the placement test were collected. Also at this time the scores for sample garments were obtained from the instructor of elementary clothing construction and one other clothing instructor in each university. The completed score sheets for garments constructed, the responses to the posttest, and the completed course evaluation questionnaire were collected in late December for the four universities which offered a one-semester course. The results from the fifth university were collected in April. A copy of the university catalog was obtained from each of the participating universities.

Treatment of Data

Coding of data

To facilitate the analysis of data the following coding plan was used. Within each university the students' names were listed alphabetically and a three digit number was assigned to each. The first digit
identified the university and the second and third digits identified the student by position on the list.

The test results were coded as scored. The responses to items on both the course evaluation questionnaire, included in Appendix H, and the clothing construction objectives questionnaire, included in Appendix B, were coded as recorded. Items pertaining to clothing construction background experience on the student background questionnaire were scored individually. Items which had numerical responses were coded as scored. Items which had a yes or no response were coded 1 for yes and 0 for no. Items on the student background questionnaire dealing with finger dexterity background experience were also scored individually. The decision to treat each item separately was based on research findings of Patson (1952) and Nieman (1961) as reported in the Review of Literature. Items which had numerical responses were coded as scored while those which had yes or no responses were coded 1 for yes and 0 for no. Mean scores were calculated for all garments constructed by each student.

Course comparison

In order to establish whether the elementary clothing construction offerings in the five participating universities were comparable, the following procedures were followed:

1. The university catalog descriptions of the elementary clothing course in each university were studied to determine the amount of class time devoted to clothing construction.

2. Information obtained from interviews with the instructors in the five universities was compared. This information included: the areas of
concentration of the home economics program for which the elementary clothing course was required, whether students from other programs were permitted to enroll in the course, whether grouping was used and, if so, on what basis, and whether the items on the proposed placement test were representative of the objectives of the clothing construction segment of the course.

3. Responses to the course evaluation questionnaire completed by the instructors were compared to determine if each objective was emphasized to the same degree in each university.

4. An analysis of variance was computed using the numerical responses to the student course evaluation questionnaire. F-values were examined to determine if there was significant variation between universities on the extent of difficulty experienced with course objectives. Means and standard deviations were obtained for responses of each university. Scattergrams were constructed showing the means for each item for the five universities as well as the instructors' responses to the extent of emphasis placed on course objectives. These scattergrams were examined to compare responses to each item by university.

5. An item analysis was computed for the responses to the posttest for students in each university and for the total population of participating students. Scattergrams were constructed using the difficulty index of each item. The difficulty index of each item for each university was plotted against the difficulty index for the combined analysis. The five scattergrams are included in Appendix K as Figures 18, 19, 20, 21, and 22. A pool of 52 items which had similar difficulty indices in all universities was identified. Because one of the universities seemed to be
different from the others, in that the spread of indices was wider, it was excluded. Examination of the scattergrams of the remaining four universities indicated that 69 items were similar in difficulty indices. This topic will be treated in greater detail in the discussion of criteria in Findings and Discussion.

Analysis of predictors and criteria

An item analysis was computed for the pretest and posttest for the five universities using the 52 items which were common to all five universities. An item analysis of both pretest and posttest was computed using the 69 items identified as common to the four universities. From the analysis the test reliability, mean scores, standard deviations, distractor analysis, difficulty indices, and discriminating power of items were determined.

To test the reliability of the garment scores within and among the five universities a factorial analysis of variance was computed using the scores assigned to the sample garments. Three methods of treating the scores were used. For the first method a mean score of all applicable construction processes was calculated for each garment for each judge. For the second method the mean score was calculated for each garment using the scores for the construction processes which were common to all three sample garments. For the third method the mean score was calculated for the construction processes that were unique to each garment.

In order to determine whether the responses of the students to the extent of the difficulty experienced with course objectives could be used as one score for prediction in the prediction formula, correlations of
responses to both the comprehension and application of the principles involved in 32 course objectives were computed. A correlation of these items was computed for the responses of all students within the four universities and for responses of the students in each of the five universities.

Analysis of variance was computed using each of the predictors and criteria for the five universities combined and for the four universities which were found to be similar on posttest results. Analysis of variance was computed, also, for each of the five universities using the garment scores as a sixth criterion.

The following 12 predictors were used in this research:

1. Cognitive abilities in clothing construction as measured by the pretest
2. The number of years education in clothing construction at both the junior and senior high school levels
3. The number of years education in clothing construction in a 4-H program
4. Home learning of clothing construction
5. The number of garments a student made in two years prior to enrollment in the college elementary clothing course
6. The percentage of her own clothing a student made in two years prior to enrollment in the college elementary clothing course
7. The number of years a student made her own clothing
8. Previous experience with making doll clothes
9. Previous experience with knitting
10. Previous experience with crocheting
11. The number of years experience with playing the piano and organ.
12. Typing speed in number of words per minute.

The data for predictors 2-12 were obtained from the completed background experience questionnaires.

There were five criteria used in this research for measuring performance in clothing construction:

1. Cognitive ability in clothing construction as measured by the posttest.
2. The extent of difficulty experienced with comprehension and application of clothing construction objectives.
3. The extent to which the clothing construction portion of the clothing course was judged to be too easy.
4. The judged extent of learning of clothing construction experienced during the course.
5. The extent of enjoyment of sewing identified by the student.

The data for the last four criteria were obtained from the course evaluation questionnaire; data for criterion 1, cognitive achievement in clothing construction, were obtained from scores on the 69-item paper-and-pencil posttest. The score on garments constructed by each student could not be used in the analyses using the four universities because of inconsistency in scoring among universities. This topic will be discussed later in Findings and Discussion.

In order to determine what weights should be assigned each predictor score and each criterion score in the prediction formula a panel of judges rated the importance of each proposed variable. These judges were five members of the Clothing and Textiles Department at Iowa State University.
who had experience with the placement test and the elementary clothing construction course.

A questionnaire was developed for use by the judges in rating the variables. A statement was made about each variable and each judge was asked to respond to each statement by expressing the extent of agreement or disagreement with it. The response form was a 99-point certainty scale in which 99 meant the judge was completely certain she agreed with the statement, 1 meant the judge was completely certain she disagreed with the statement, and 50 meant uncertainty. Intervening numbers represented degrees of certainty of either agreement or disagreement with the statements. The questionnaire is included in Appendix I.

The five responses to each statement were examined and it was found that there was a wide range of responses for nine statements indicating lack of agreement about the importance of these nine variables. It was believed that there was some misunderstanding regarding the interpretation of either the rating scale or the statements. Each judge was interviewed and during the discussion some misinterpretations were identified and clarified. Each judge then reviewed her responses and in some cases changed some of them. A higher degree of agreement among judges resulted. Correlations of ratings among judges were computed.

Based on the judges' ratings of predictors a weight was assigned each predictor and criterion. Intercorrelations among specific predictors and criteria were computed for the four universities combined. Composite weighted predictor and criterion scores were calculated and the correlation between them was computed.
Intercorrelations among specific predictors and criteria were calculated also for each of the five universities using garment scores as the sixth criterion. Composite weighted predictor and criterion scores were calculated for each university and the correlation between them was computed.
FINDINGS AND DISCUSSION

One of the objectives of this research was to adapt and test the predictive validity of predictive measures for use in the placement of students in beginning clothing construction in each of five universities located in the Maritime Provinces of Canada. Another objective was to describe the clothing construction segment of beginning clothing courses at these five universities. The findings pertinent to these objectives will be reported and discussed under the following headings: description of participants, instructors' judgments of need for placement, predictors, criteria, comparison of courses, and intercorrelations among variables.

Description of Participants

Students enrolled in the elementary clothing course in 1972-1973 at five universities located in the Maritime Provinces of Canada and offering home economics degrees were participants in this research. The instructor of elementary clothing construction in each university provided information about courses, scored students' garments using the researcher's scoring instruments, and administered the pretest, posttest, and questionnaires to the students.

One faculty member in each university was responsible for the clothing construction portion of the elementary clothing course. Four of the instructors held degrees at the Bachelor's level and one had a Master's degree. Three of the instructors had previous experience with the clothing construction course at a university, and two others had no previous experience at the university level.
In all five universities there were 173 students who completed the pretest and background questionnaire. Of this total, 158 completed the posttest and course evaluation questionnaire. One student in University C came from Africa and, according to her instructor, her background education and experience in clothing construction were very different from that of the other students. The data for this student were dropped from the study, so data are reported for 157 students. The distribution of students among the five universities is given in Table 1. In the report of the findings the universities will be referred to by letter as Universities A, B, C, D, and E.

Table 1

Distribution of Students among the Five Universities According to Curriculum

<table>
<thead>
<tr>
<th>Curriculum</th>
<th>Universities</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>General home economics</td>
<td>41</td>
<td>23</td>
</tr>
<tr>
<td>Clothing</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Food and nutrition</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Home economics education</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>Consumer studies</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Family studies</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>27</td>
</tr>
</tbody>
</table>

While the majority of the students were enrolled in the general home economics degree program, some indicated that they were in one of the other major curricula offered. Table 1 shows the distribution of students in each university by curriculum in which they were enrolled.
From information obtained during interviews with the instructors it was learned that in Universities A, C, and E students in programs other than home economics sometimes elect the elementary clothing course. In this study two students, one in University C and one in University E, were enrolled in the education program. In all universities except University C the clothing course is required for students in all home economics programs. In University C it is required only for the home economics education concentration and the clothing concentration.

The majority of the students in four of the five universities were classified as freshmen. In University C the elementary clothing course is offered at the second year level. The distribution of students according to class level is given in Table 2.

Table 2

<table>
<thead>
<tr>
<th>Class level</th>
<th>Universities</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Freshman</td>
<td>43</td>
<td>24</td>
</tr>
<tr>
<td>Sophomore</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Junior</td>
<td>19</td>
<td>2</td>
</tr>
<tr>
<td>Senior</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Continuing educationa</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

aContinuing education is a program which provides opportunity for a mature person to pursue educational goals.

Instructors' Judgments of Need for Placement

On the instructor interview questionnaire, a copy of which is included in Appendix C, each instructor was asked if grouping of students
was utilized in her clothing instruction class on the basis of similarities in level of cognitive ability in clothing construction and previous experience related to clothing construction. The instructors in Universities A, B, D, and E responded that sectioning was used for practical reasons related to class size and scheduling, but no attempt was made to group students according to similarities in levels of behavior related to clothing construction. The instructor in University C responded that attempts had been made to determine the amount of previous education and experience of students in clothing construction for the purpose of placement, but that results were not satisfactory.

The instructor in University A indicated that she believed that placement was an acceptable procedure but judged that there was so much variability that it would result in too many sections. She said also that she found that students differed from year to year in extent of previous education and experience in clothing construction. The instructors in Universities B, C, D, and E responded that there was a need for placement in order to provide for greater flexibility in the course and to allow for instruction to be adapted to accommodate differences among students in levels of entering behavior. They also replied that placement would give students opportunity to progress from their initial behavioral level to higher levels and thus prevent needless repetition of work for those with previous experience and education in clothing construction.

When asked if the paper-and-pencil test would be important to their program, the instructors in Universities B, C, D, and E responded affirmatively, and the instructor in University A expressed uncertainty. The instructors in Universities A and B indicated that there would be
difficulties with scheduling if students were assigned to a particular group.

**Predictors**

**Cognitive ability in clothing construction**

Scores on the paper-and-pencil pretest were used for prediction of performance in clothing construction in this research. During the first interview with the participating instructor in each university, the paper-and-pencil test was examined to see if the test items were representative of the objectives of the course. The responses of the instructors indicated that in all universities except University B the test items were representative of the objectives. In University B the instructor responded that students were not expected to use garment linings; therefore, the test item pertaining to lining was not appropriate for students in that university. The content validity of the paper-and-pencil test was thus established for Universities A, C, D, and E and, with the one exception cited above, for University B. As mentioned in the Procedure, 52 items of the posttest were found to have similar difficulty indices in the five universities. When University B was excluded, 69 items were found to have similar difficulty indices. Because University B was different from the other universities on the posttest results, some of the analyses were computed for the other four universities. However, an item analysis of the 52-item pretest was computed for the five universities combined. The results of this analysis are presented in Table 37 in Appendix J.

From the item analysis of the 69 common items of the pretest for
of the four universities and for the four universities combined (n=130) the statistics in Table 3 were obtained.

<table>
<thead>
<tr>
<th>Item</th>
<th>Universities</th>
<th>Combined universities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>Reliability</td>
<td>0.73</td>
<td>0.62</td>
</tr>
<tr>
<td>Mean score</td>
<td>40.74</td>
<td>39.18</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>7.19</td>
<td>6.23</td>
</tr>
<tr>
<td>Number of test items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Index of discrimination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 0.40</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>0.40-0.20</td>
<td>33</td>
<td>23</td>
</tr>
<tr>
<td>0.20-0.15</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>0.15-0.05</td>
<td>7</td>
<td>18</td>
</tr>
<tr>
<td>Less than 0.05</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Difficulty index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 70</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>70-30</td>
<td>43</td>
<td>46</td>
</tr>
<tr>
<td>Less than 30</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

Because of the small number of students in each university, interpretation of the data given in Table 3 was made, for the most part, on the results of the combined analysis. However, it was noted that the reliability coefficient for the test in University E was lower than for any of the other universities. The standard deviation of scores in University E was smaller than in the other universities. This indicates a narrow range of scores and, as mentioned in the Review of Literature, the reliability coefficient tends to be lower when the range of scores is narrow. There was also a large number of items (22) to which more than 70 percent of
the students in University E responded correctly. Reliability coefficients tend to be low if tests are too easy.

For the four universities combined the reliability coefficient of the 69-item test was considered adequate. Because the correlation analysis was computed for the four universities combined, the 69-item pretest was considered reliable.

Of the 69 items analyzed, there were 52 that had satisfactory-to-good discriminating power for the combined group. According to Menne (1970, p. 9), the 18 items with discriminating indices below .15 need to be examined for ambiguity or for low difficulty level and reworded for subsequent administrations of the test.

There were 47 of the items that were within the acceptable range of difficulty of 30 to 70 percent (Menne, 1970, p. 8). The 20 items with difficulty indices above 70 were too easy. They need to be examined to determine if the index of discriminating power is low and, if so, the items need to be reworded for subsequent administrations of the test.

As mentioned earlier, Menne (1970, p. 7) suggested that each item response option or distractor should be plausible enough to be chosen by at least one student in a class of 50. Information provided by the analysis of the pretest results showed that for 65 of the 69 test items all distractors were chosen by two or more of the 130 students. Each of the other four items had one distractor which was chosen by only one student. Each of these four items should be examined, and suitable distractors should be substituted for those that are not functioning well.

Results of the analysis of variance showed that there was no
difference between the universities on the scores for the 69-item pretest. The F-value was 2.58 and the tabular F-value at the .05 level is 2.68 for 3 and 126 degrees of freedom.

Experience related to clothing construction

Educational background It was expected that there were differences in extent of prior education in clothing construction among students in each university. The following data were presented and examined to determine if the expectation was justified. The data pertaining to educational background were obtained from the background experience questionnaire which is included in Appendix E. This questionnaire was administered during the first scheduled class in clothing construction.

Table 4 summarizes the data on background experience of the students in terms of study of clothing construction in high school. The number of years represents the total amount of time the students spent in clothing construction at the high school level. The number of years is the aggregate of full years, semesters, and units of clothing construction at the seventh through twelfth grade levels. One unit was considered equivalent to a half-semester; two semesters were considered equivalent to one year. A more detailed presentation of these data is given in Table 38 in Appendix J. Table 38 gives the number of students in each university who had one unit, one semester, or one year of clothing construction in each of the grades from 7 through 12. It also gives the total number of students who had clothing construction at each grade level.

From an examination of the data in Table 4 it was found that two of the 157 students had six full years of clothing-construction education at
Table 4

Distribution of Students According to Time Spent in Clothing Construction at the High School Level

<table>
<thead>
<tr>
<th>Number of years</th>
<th>Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>5 1/2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>4 1/2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3 1/2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>2 1/2</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>1 1/2</td>
<td>8</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Less than 1/2</td>
<td>1</td>
</tr>
<tr>
<td>None</td>
<td>7</td>
</tr>
</tbody>
</table>

Mean: 1.57 1.04 1.59 1.04 1.55
Standard deviation: 1.30 0.78 0.85 0.86 1.13

the high school level and 19 had none. There was variation among students within each university in the amount of time spent in clothing construction at the high school level. Results of the analysis of variance showed that there was no difference between universities on the mean number of years of high school education in clothing construction. The calculated F-value was 2.21 and the tabular F-value at the .05 level is 2.43 for 4 and 152 degrees of freedom.

Few of the total number of students indicated they had studied clothing construction in a 4-H program. Some indicated that they studied it at home and some indicated that they had learned it from some source other
than high school, 4-H program, or home. The distribution of students who learned clothing construction in 4-H, at home, and elsewhere is given in Table 5.

Table 5
Distribution of Students Who Learned Clothing Construction in 4-H Programs, at Home, and Elsewhere

<table>
<thead>
<tr>
<th>Source</th>
<th>Universities</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 year</td>
<td></td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>2 years</td>
<td></td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>3 years</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>4 years</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>5 years or more</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>0.02</td>
<td>0.01</td>
<td>0.01</td>
<td>0.03</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>Standard deviation</td>
<td></td>
<td>0.10</td>
<td>0.05</td>
<td>0.08</td>
<td>0.11</td>
<td>0.18</td>
<td></td>
</tr>
<tr>
<td>At home</td>
<td></td>
<td>26</td>
<td>20</td>
<td>26</td>
<td>13</td>
<td>14</td>
<td>99</td>
</tr>
<tr>
<td>Elsewhere</td>
<td></td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>19</td>
</tr>
</tbody>
</table>

The students who indicated that they had learned clothing construction some place other than in high school, in 4-H, or at home included the source. There were four who had taken a course given by a sewing machine company; two learned clothing construction from a tailor; six had attended a course given by a community school; two had learned from a clothing construction teacher; two had learned from a seamstress; and two had learned in Girl Guides.

Visual inspection of the data presented in Table 5 indicates that
there was variation among students within each university in the amount of time spent in learning clothing construction in a 4-H program. Results of the analysis of variance using data for the five universities showed that there was significant difference at the .05 level between universities on the mean number of years of clothing construction education in a 4-H program. The calculated F-value was 3.19 and the tabular F-value at the .05 level is 2.43 for 4 and 152 degrees of freedom. When University B was eliminated from the analysis of variance, a significant difference was found at the .05 level between the four universities. The calculated F-value was 3.40 and the tabular F-value at the .05 level is 2.68 for 3 and 126 degrees of freedom.

There was no significant difference between universities on the number of students who learned clothing construction at home. The calculated F-value was 1.05 and the tabular F-value at the .05 level is 2.43 for 4 and 152 degrees of freedom.

As expected, the findings presented above show that there were variations among students in each university regarding extent of background education in clothing construction. There was no difference between universities on the extent of education at the high school level or at home. There was a significant difference between universities on the extent of clothing-construction education in a 4-H program.

Experience in clothing construction

It was expected that there were differences among students in each university in the extent of background experience in clothing construction. Data on this topic were obtained from the background experience questionnaire which is included in Appendix E. Table 6 gives a summary of the number of students in each
university who made garments in the two years prior to enrollment in the college elementary clothing course. A more detailed presentation of these data, showing the distribution of students who constructed garments by garment type and fabric type, is given in Table 39 in Appendix J.

Table 6

Distribution of Students Who Made Garments in Two Years Prior to Enrollment in the Clothing Course

<table>
<thead>
<tr>
<th>Number of garments</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>80-89</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70-79</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-69</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>50-59</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td>10</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>20-29</td>
<td>12</td>
<td>9</td>
<td>11</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>10-19</td>
<td>18</td>
<td>12</td>
<td>13</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>1-9</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean number of garments: 14.80 11.40 15.18 14.04 14.14
Standard deviation: 11.57 12.59 15.84 12.19 13.52

By inspection of the data in Table 6 it was found that there were differences within each university with regard to the number of garments the students had constructed in the two years. Most of the students in each university made fewer than 30 garments in the two years. Results of the analysis of variance using the data for the five universities showed that there was no significant difference between universities on the number of garments students had made in two years prior to enrollment in
the course. The calculated F-value was .36 and the tabular F-value at the .05 level is 2.43 for 4 and 152 degrees of freedom.

Responses to the question, "What percentage of your own clothing have you made in the past two years?" showed that there was variation among the students within each university. The summary of responses is given in Table 7.

Table 7

Distribution of Students Who Made Their Own Clothing by Percentage of Clothing Made

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>95</td>
<td>1</td>
</tr>
<tr>
<td>90</td>
<td>1</td>
</tr>
<tr>
<td>85</td>
<td>4</td>
</tr>
<tr>
<td>80</td>
<td>2</td>
</tr>
<tr>
<td>75</td>
<td>4</td>
</tr>
<tr>
<td>70</td>
<td>4</td>
</tr>
<tr>
<td>65</td>
<td>2</td>
</tr>
<tr>
<td>60</td>
<td>7</td>
</tr>
<tr>
<td>55</td>
<td>7</td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>1</td>
</tr>
<tr>
<td>40</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>1</td>
</tr>
<tr>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Less than 10</td>
<td>3</td>
</tr>
<tr>
<td>None</td>
<td>5</td>
</tr>
</tbody>
</table>

Mean percentage of clothing made

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.70</td>
<td>29.81</td>
<td>32.37</td>
<td>39.12</td>
<td>32.86</td>
<td></td>
</tr>
</tbody>
</table>

Standard deviation

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.32</td>
<td>28.66</td>
<td>28.01</td>
<td>31.62</td>
<td>25.88</td>
<td></td>
</tr>
</tbody>
</table>
Visual inspection of data in Table 7 indicates that in University E all students responded that they made some proportion of their own clothing. The range of percentages was narrower in this university than in the others. The proportion of clothing made by the students in Universities A, B, and D ranged from 0 to 90 percent, and in University C from 0 to 95 percent. Results of the analysis of variance using data for the five universities showed that there was no significant difference between universities in the proportion of their own clothing students made in two years prior to enrollment in the clothing course. The calculated F-value was .89 and the tabular F-value at the .05 level is 2.43 for 4 and 152 degrees of freedom.

The students responded to a question about the number of years they had made their own clothing. A summary of the responses to this question is given in Table 8.

Table 8
Distribution of Students According to Number of Years They Had Made Their Own Clothing

<table>
<thead>
<tr>
<th>Number of years</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td></td>
<td>4</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>11</td>
<td>5</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>5</td>
</tr>
</tbody>
</table>

Mean number of years
- 3.66
- 2.26
- 4.05
- 3.12
- 3.38

Standard deviation
- 2.14
- 1.90
- 2.70
- 2.67
- 2.10
Visual inspection of the data presented in Table 8 indicates that there were differences within universities in the number of years students had made their own clothing. There was significant difference at the .05 level between universities on the number of years students made their own clothing. The calculated F-value was 2.51 and the tabular F-value is 2.43 for 4 and 152 degrees of freedom. When University B was eliminated from the analysis, there was no significant difference between the remaining universities. The calculated F-value was .79 and the tabular F-value at the .05 level is 2.68 for 3 and 126 degrees of freedom.

There seemed to be some discrepancy between the responses concerning the number of years students made their own clothing as given in Table 8 and responses to the item about percentage of their own clothing the students had made as given in Table 7. An examination of the responses of the students who said they did not make their own clothing according to data in Table 8 revealed that some of them responded that they made some proportion (less than 20 percent) of their own clothing as included in Table 7.

Inspection of the data presented in Tables 6, 7, and 8 led to the conclusion that there were variations among students within each university in the extent of experience in clothing construction prior to enrollment in the university clothing course. It was expected that this would be the case. As reported above, there was no significant difference between the five universities on the number of garments made or the percentage of garments made in two years prior to enrollment. This finding was expected also. However, there was significant difference at the .05 level between the five universities on the number of years students
had made their own clothes but no significant difference between the four universities when University B was eliminated from the analysis.

Finger dexterity experience  As mentioned previously in the Review of Literature, some researchers (Scholtes, 1948; Patson, 1952) found a relationship between finger dexterity experience and performance in clothing construction. In this research the items dealing with finger dexterity were included in the background experience questionnaire which is included in Appendix E. Each student identified the extent of her experience with making doll clothes, knitting, crocheting, playing the piano, playing the organ, and typing. It was expected that there would be differences among students in each university in the amount of background experiences contributing to finger dexterity.

A summary of responses to the items dealing with experience making doll clothes, knitting, and crocheting is presented in Table 9.

Table 9

<table>
<thead>
<tr>
<th>Item</th>
<th>Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Making doll clothes</td>
<td>24</td>
</tr>
<tr>
<td>Knitting</td>
<td>23</td>
</tr>
<tr>
<td>Crocheting</td>
<td>9</td>
</tr>
<tr>
<td>Both knitting and crocheting</td>
<td>6</td>
</tr>
</tbody>
</table>

Approximately 50 percent of the students in Universities A, B, and E, approximately 75 percent in University D, and approximately 70 percent in University C had made doll clothes. There was no significant difference
between universities on the number of students who made doll clothes. The calculated \( F \)-value was 1.64 and the tabular \( F \)-value at the .05 level is 2.43 for 4 and 152 degrees of freedom.

As Table 9 shows, there were fewer students who responded positively to the item dealing with crocheting than with knitting. There was a significant difference at the .05 level between universities on the number of students who had previous experience with knitting. The calculated \( F \)-value was 3.14 and the tabular \( F \)-value at the .05 level is 2.43 for 4 and 152 degrees of freedom. There was no significant difference between universities on the number of students who had previous experience with crocheting. The calculated \( F \)-value was .79 and the tabular \( F \)-value at the .05 level is 2.43 for 4 and 152 degrees of freedom.

Table 10 presents a summary of responses regarding experience in playing a piano and Table 11 summarizes the responses regarding experience in playing an organ. Some students in each university did not respond to the items dealing with experience with piano and organ. It was assumed that no response meant no experience. There were two students in University A who indicated they had experience with playing both piano and organ. There was one of these students who had 10 years of experience with each; the other student had two years experience with piano and 11 years of experience with organ. Examination of the data presented in Tables 10 and 11 indicates that there were differences among students within each university on the extent of experience with playing piano and organ.
### Table 10
Distribution of Students by Number of Years of Experience Playing a Piano

<table>
<thead>
<tr>
<th>Number of years</th>
<th>Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
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<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>14</td>
</tr>
<tr>
<td>No response</td>
<td>8</td>
</tr>
</tbody>
</table>

### Table 11
Distribution of Students by Number of Years of Experience Playing an Organ

<table>
<thead>
<tr>
<th>Number of years</th>
<th>Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td></td>
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<tr>
<td>None</td>
<td>26</td>
</tr>
<tr>
<td>No response</td>
<td>18</td>
</tr>
</tbody>
</table>
The data from Tables 10 and 11 were combined for analysis because of the similarity of the two types of experience. The mean number of years of experience with playing both piano and organ and standard deviations are given in Table 12.

Table 12
Means and Standard Deviations of Numbers of Years of Experience with Playing Piano and Organ

<table>
<thead>
<tr>
<th>Item</th>
<th>Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Mean</td>
<td>3.89</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>4.51</td>
</tr>
</tbody>
</table>

Results of the analysis of variance using data for the five universities showed that there was significant difference at the .01 level between universities on the number of years of experience with playing piano and organ. The calculated $F$-value was 4.01 and the tabular $F$-value at the .01 level is 3.44 for 4 and 152 degrees of freedom. When University B was eliminated there was a significant difference at the .05 level between the remaining four universities. The calculated $F$-value was 3.58 and the tabular $F$-value at the .05 level is 2.68 for 3 and 126 degrees of freedom.

Most of the students who responded that they had some typing experience gave the typing speed in number of words per minute. Some students, five in University A, one in University B, four in University C, and one in University D, responded they did not know what their typing speed was. A summary of the responses to this item is given in Table 13.
There were differences within universities on the extent of typing experience. The results of the analysis of variance using data for the five universities showed that there was no significant difference among universities on the extent of typing experience. The calculated F-value was .90 and the tabular F-value at the .05 level is 2.43 for 4 and 152 degrees of freedom.

As expected, the findings show that there were variations among students in each university regarding finger dexterity experiences. No difference was found between the five universities on the extent of experiences with typing, making doll clothes, and crocheting. However,
there were differences between the universities on experience with playing piano and organ and with knitting.

Criteria

Cognitive ability in clothing construction

The 98-item posttest was used to determine the extent of cognitive ability of the students after the completion of the clothing construction portion of the elementary clothing course. An item analysis of the test was conducted for each of the five universities and for the five universities combined.

Responses to items were omitted in 51 cases in University A, 28 in University B, 31 in University C, 23 in University D, and 13 in University E. The fact that some students did not attempt to respond to some items appears to indicate that when they did not know the correct response, they did not attempt to guess it.

A summary of statistics of the item analysis of the 98-item posttest is presented in Table 14. Visual inspection of the data in Table 14 shows that the reliability of the posttest was acceptable for each of the five universities and for the five universities combined. The mean score varied among universities, University C having the highest mean score and University B the lowest. It appears that students in University B exhibited a lower level of achievement than those in the other four universities, while those in University C had the highest.
Table 14
Results of Item Analysis of 98-item Posttest for Five Universities and the Universities Combined

<table>
<thead>
<tr>
<th>Item</th>
<th>Universities</th>
<th>Combined universities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Reliability</td>
<td>0.78</td>
<td>0.73</td>
</tr>
<tr>
<td>Mean score</td>
<td>60.62</td>
<td>51.89</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>9.03</td>
<td>8.58</td>
</tr>
<tr>
<td>Number of test items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Index of discrimination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 0.40</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>0.40-0.20</td>
<td>43</td>
<td>38</td>
</tr>
<tr>
<td>0.20-0.15</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>0.15-0.05</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>Less than 0.05</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>Difficulty index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 70</td>
<td>39</td>
<td>19</td>
</tr>
<tr>
<td>30-70</td>
<td>52</td>
<td>68</td>
</tr>
<tr>
<td>Less than 30</td>
<td>7</td>
<td>11</td>
</tr>
</tbody>
</table>

The discriminating power of 60 items of the test was very good to satisfactory (over 0.40-0.20) for the overall analysis. Those items with discriminating power below 0.20 (38 items on the combined analysis) were questionable. In each of the universities there were fewer than 60 items with very good to satisfactory discriminating power. This may be due, in part, to the small number of students in each university.

Examination of the difficulty indices shows that there was a relatively large number of items to which more than 70 percent of the students responded correctly in each university and in the combined group. It will be noted that there were fewer items (19) in University B than in the other universities to which more than 70 percent of the students responded
correctly. There were relatively few items (2) to which fewer than 30 percent of the students responded correctly in the combined group. It will be noted that for 11 items fewer than 30 percent of the students in University B responded correctly. This finding implies that the test was too easy, but less easy for students in University B than for the other four universities. The fact that the test was too easy may be one of the reasons for the unsatisfactory discriminating power of many of the items.

The difficulty indices for each item of the posttest were compared to determine if there was any difference among the universities in the percentage of students responding correctly to each item. Scattergrams were constructed by plotting the difficulty index of each item of the test taken from the combined item analysis against the difficulty index of each item for each university. These scattergrams are presented as Figures 18, 19, 20, 21, and 22, and are included in Appendix K. Inspection of the plots indicated that for University B the spread of difficulty indices for all items was greater than that for the other universities.

A decision was made to consider as common those items whose difficulty indices for all universities were concentrated around the diagonal of the scattergrams. That is, items to which students in all universities responded in a similar manner were considered as representing the extent to which items were common. The area of concentration was defined by lines drawn on either side of the true diagonal (See Figures 18, 19, 20, 21, and 22). Difficulty levels of 52 items were within the defined band for all five universities. If the scattergram for University B was not included, 69 items were found to have difficulty levels falling within the defined limits for the other four universities. That is, for 69 items the
percentages of students in Universities A, C, D, and E who responded correctly were within the range defined by the band. This did not mean that the difficulty levels for all items were acceptable, but that the students in these universities were similar in their responses to these 69 items. Because University B was different from the other four universities on this and other variables, it was not included in some of the analyses of data. The 69-item test was used as a criterion measure for Universities A, C, D, and E. The objectives which these items represent are discussed in the section on identification of common objectives.

Results of the item analysis of the 52 items found to be common to the five universities are presented in Table 40 in Appendix J. A summary of statistics obtained from the item analysis of the 69-item posttest for each of the four universities and for the combination of the four universities is presented in Table 15. Because the 69-item posttest was used as a criterion measure for the four universities combined, discussion of the statistics presented in Table 15 will be limited to that which pertains to the combined analysis. The results of the item analysis for each individual university should be interpreted with caution because of the small number of students in each university.

The reliability coefficient (.69) of the 69-item posttest for the combined group was considered acceptable, especially when other criterion measures were used. It was slightly lower than that for the pretest (.70). The mean score for the group was 44.76 of a possible 59.00. This represents a gain over the mean score of 39.08 on the 69-item pretest. It was expected that there would be an overall gain in cognitive ability in clothing construction as measured by the paper-and-pencil test.
Table 15

Results of Item Analysis of 69-item Posttest for Four Universities and the Universities Combined

<table>
<thead>
<tr>
<th>Item</th>
<th>Universities</th>
<th>Combined universities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>Reliability</td>
<td>0.73</td>
<td>0.62</td>
</tr>
<tr>
<td>Mean score</td>
<td>45.11</td>
<td>45.21</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>6.90</td>
<td>5.70</td>
</tr>
</tbody>
</table>

Number of test items

Index of discrimination

<table>
<thead>
<tr>
<th>Over 0.40</th>
<th>13</th>
<th>12</th>
<th>16</th>
<th>14</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.40-0.20</td>
<td>34</td>
<td>18</td>
<td>19</td>
<td>23</td>
<td>41</td>
</tr>
<tr>
<td>0.20-0.15</td>
<td>5</td>
<td>10</td>
<td>6</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>0.15-0.05</td>
<td>8</td>
<td>17</td>
<td>11</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Less than 0.05</td>
<td>9</td>
<td>12</td>
<td>17</td>
<td>19</td>
<td>5</td>
</tr>
</tbody>
</table>

Difficulty index

<table>
<thead>
<tr>
<th>Over 70</th>
<th>34</th>
<th>32</th>
<th>28</th>
<th>30</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-70</td>
<td>33</td>
<td>31</td>
<td>39</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>Less than 30</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

The overall standard deviation of the scores on the 69-item posttest was 6.48, which was smaller than that for the pretest, 7.03. As reported in the Review of Literature the spread of scores of a test has an effect on the reliability coefficient; the narrower the spread the lower the reliability coefficient tends to be. The standard deviation of the posttest indicates that there was a narrower spread of scores for the posttest than for the pretest and could account for the slightly lower reliability coefficient of the posttest over the pretest.

Results of the analysis of variance showed that there was no significant difference between the four universities on the scores for the 69-item
The F-value was .40 and the tabular F-value at the .05 level is 2.68 for 3 and 126 degrees of freedom.

The discriminating power of 43 items was in the category, very good to satisfactory. This number of items was slightly fewer than was found for the 69-item pretest. An examination of data given for difficulty indices shows that more than 70 percent of the students in the four universities (n=130) responded correctly to 31 items. This was an increase of 11 items in this category over the 69-item pretest. There were five items to which fewer than 30 percent responded correctly, while there were two in this category on the 69-item pretest. The overall finding was that the 69-item posttest was easier for students in the four universities than was the 69-item pretest. This was assumed to be due to the learning that occurred during the course.

Information provided by the analysis of the 69-item posttest results showed that for 46 of the 69 items, all distractors were chosen by two or more of the 130 students. There were 14 test items for which one or two options were not chosen and 9 items for which one or two options were chosen by one student. Each of the 23 items which had fewer than two students selecting response options should be examined and, where possible, suitable substitutes should be found for the options that were not functioning well.

**Extent of difficulty experienced with course objectives**

The data for the following criteria were obtained from the completed course evaluation questionnaires. A copy of this questionnaire is included in Appendix H. Data were obtained regarding the extent of difficulty the
students experienced with both the comprehension and application of 32 course objectives and the reasons given by students as to why they experienced difficulty or no difficulty with the course. As used in the course evaluation questionnaire, the term, comprehension, refers to cognitive ability as defined by Bloom et al. (1965, p. 89) as comprehension, and the term, application, refers to practical performance incorporating both the cognitive abilities defined by Bloom et al. (1965, p. 205) as application and motor abilities involved in the construction tasks.

From the analysis of variance of responses to those items for which a rating scale was used, the following information was obtained: mean student response for each item for each university, standard deviation of each item score for each university, and F-values in testing significance of differences among university means. This information is given in the discussion of the data. The following interpretation was used in discussing the responses that were based on the 9-point rating scale: 9 and 1 meant completely certain, 8 and 2 meant strongly certain, 7 and 3 meant moderately certain, 6 and 4 meant almost uncertain, and 5 meant uncertain.

There were three categories of course objectives to which the students responded using a 9-point certainty scale. These categories were preconstruction, general construction, and specific garment construction with 12, 5, and 15 objectives in the three categories. Students responded to the extent of difficulty experienced with both the comprehension and application of principles involved in each objective. Each category of items is discussed separately. University mean responses, standard deviations, and F-values obtained from the one-way analysis of variance are reported for the items in each category.
Preconstruction objectives The university means, standard deviations, and F-values for responses to the extent of difficulty experienced with comprehension and application of principles involved in preconstruction objectives are reported in Table 16. A list of the preconstruction objectives is given in the footnote to the table.

There was significant difference among the means at the .01 level for both the comprehension and application of the principles involved in choosing the pattern. The means ranged from 1.61 to 3.62 for comprehension and 1.74 to 4.19 for application. In both cases students in University E had the highest means and students in University C the lowest. The mean response for University E on the extent of difficulty experienced with the application of the principles involved in choosing the pattern was approaching uncertainty. All other responses ranged from strongly certain to moderately certain that the principles were easy.

There was significant difference among the means at the .05 level for comprehension and application of principles involved in altering the pattern. Examination of the mean responses to this item showed that they ranged from 2.68 to 4.57 for comprehension with the mean for University E being the highest and registering uncertainty as to difficulty experienced with the comprehension of principles involved in pattern alteration. All other means indicated that students in other universities were moderately certain these principles were easy. The mean response for application of these principles ranged from 3.18 to 4.95, with the mean response for University E again having the highest value almost at the uncertainty level. The responses for the other universities indicated that the students were moderately certain to almost uncertain the item was easy.
Table 16

Means, Standard Deviations, and F-values by University for Extent of Difficulty Students Experienced with Comprehension and Application of Principles Involved in Preconstruction Objectives

<table>
<thead>
<tr>
<th>Item</th>
<th>A Mean</th>
<th>A S</th>
<th>B Mean</th>
<th>B S</th>
<th>C Mean</th>
<th>C S</th>
<th>D Mean</th>
<th>D S</th>
<th>E Mean</th>
<th>E S</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.87</td>
<td>1.68</td>
<td>2.22</td>
<td>1.95</td>
<td>1.71</td>
<td>1.30</td>
<td>1.37</td>
<td>0.56</td>
<td>2.19</td>
<td>2.06</td>
<td>1.17</td>
</tr>
<tr>
<td>2</td>
<td>2.02</td>
<td>1.91</td>
<td>2.74</td>
<td>2.20</td>
<td>1.79</td>
<td>1.05</td>
<td>2.17</td>
<td>1.99</td>
<td>2.14</td>
<td>1.55</td>
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<td>3</td>
<td>2.02</td>
<td>1.86</td>
<td>2.33</td>
<td>1.78</td>
<td>1.87</td>
<td>1.36</td>
<td>2.42</td>
<td>1.91</td>
<td>3.09</td>
<td>2.09</td>
<td>1.31</td>
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<tr>
<td>4</td>
<td>2.17</td>
<td>1.97</td>
<td>2.56</td>
<td>2.33</td>
<td>1.61</td>
<td>0.96</td>
<td>1.87</td>
<td>1.23</td>
<td>3.62</td>
<td>2.80</td>
<td>4.14**</td>
</tr>
<tr>
<td>5</td>
<td>2.08</td>
<td>1.80</td>
<td>1.89</td>
<td>1.75</td>
<td>1.37</td>
<td>0.70</td>
<td>1.79</td>
<td>1.41</td>
<td>1.81</td>
<td>1.40</td>
<td>1.19</td>
</tr>
<tr>
<td>6</td>
<td>2.74</td>
<td>2.37</td>
<td>3.26</td>
<td>2.20</td>
<td>2.05</td>
<td>1.34</td>
<td>2.58</td>
<td>2.04</td>
<td>3.19</td>
<td>1.94</td>
<td>1.24</td>
</tr>
<tr>
<td>7</td>
<td>3.87</td>
<td>2.47</td>
<td>3.85</td>
<td>2.40</td>
<td>2.68</td>
<td>1.72</td>
<td>2.83</td>
<td>1.82</td>
<td>4.57</td>
<td>2.32</td>
<td>3.27*</td>
</tr>
<tr>
<td>8</td>
<td>2.80</td>
<td>2.43</td>
<td>2.18</td>
<td>2.02</td>
<td>1.82</td>
<td>1.19</td>
<td>2.46</td>
<td>1.71</td>
<td>2.81</td>
<td>1.94</td>
<td>1.66</td>
</tr>
<tr>
<td>9</td>
<td>2.08</td>
<td>2.01</td>
<td>2.26</td>
<td>1.97</td>
<td>1.55</td>
<td>0.94</td>
<td>2.08</td>
<td>1.80</td>
<td>2.67</td>
<td>2.31</td>
<td>1.29</td>
</tr>
<tr>
<td>10</td>
<td>1.60</td>
<td>1.68</td>
<td>1.93</td>
<td>1.78</td>
<td>1.26</td>
<td>0.59</td>
<td>1.25</td>
<td>0.72</td>
<td>2.05</td>
<td>1.84</td>
<td>1.62</td>
</tr>
<tr>
<td>11</td>
<td>1.45</td>
<td>1.57</td>
<td>1.81</td>
<td>1.76</td>
<td>1.24</td>
<td>0.53</td>
<td>1.37</td>
<td>0.75</td>
<td>1.86</td>
<td>1.75</td>
<td>1.04</td>
</tr>
<tr>
<td>12</td>
<td>1.70</td>
<td>1.97</td>
<td>2.07</td>
<td>1.98</td>
<td>1.53</td>
<td>0.97</td>
<td>1.58</td>
<td>1.50</td>
<td>2.00</td>
<td>1.63</td>
<td>0.37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>A Mean</th>
<th>A S</th>
<th>B Mean</th>
<th>B S</th>
<th>C Mean</th>
<th>C S</th>
<th>D Mean</th>
<th>D S</th>
<th>E Mean</th>
<th>E S</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.23</td>
<td>1.93</td>
<td>2.07</td>
<td>1.61</td>
<td>2.16</td>
<td>1.33</td>
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<td>1.51</td>
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<td>1.60</td>
<td>1.29</td>
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<td>2</td>
<td>2.38</td>
<td>2.20</td>
<td>2.70</td>
<td>2.03</td>
<td>1.82</td>
<td>1.07</td>
<td>2.92</td>
<td>1.93</td>
<td>2.62</td>
<td>1.46</td>
<td>1.71</td>
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<td>3.12</td>
<td>2.26</td>
<td>3.33</td>
<td>2.30</td>
<td>1.70</td>
</tr>
<tr>
<td>4</td>
<td>2.62</td>
<td>2.30</td>
<td>2.85</td>
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<td>1.74</td>
<td>1.04</td>
<td>2.79</td>
<td>1.71</td>
<td>4.19</td>
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</tr>
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<td>3.33</td>
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<td>1.98</td>
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<td>2.89</td>
<td>2.36</td>
<td>2.39</td>
<td>1.75</td>
<td>2.92</td>
<td>2.08</td>
<td>3.33</td>
<td>1.98</td>
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<td>1.71</td>
<td>1.45</td>
<td>0.99</td>
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<td>1.62</td>
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<td>1.71</td>
<td>1.68</td>
<td>1.03</td>
<td>1.67</td>
<td>0.99</td>
<td>1.86</td>
<td>1.32</td>
<td>0.28</td>
</tr>
</tbody>
</table>

aItems: 1, choosing equipment; 2, taking body measurements; 3, checking pattern type and size; 4, choosing the pattern; 5, selecting correct yardage; 6, understanding the pattern; 7, altering the pattern; 8, preparing the fabric before cutting; 9, placing the pattern on the fabric; 10, pinning the pattern to the fabric; 11, cutting out the garment pieces; 12, marking the garment pieces.

*Significant at the .05 level.

**Significant at the .01 level.
The university mean responses for all items in the preconstruction category, which were not discussed above, indicated that the students in all universities were certain, to some degree, that the comprehension and application of principles involved in these objectives were easy. There was no significant difference among university means for any of these items.

**General construction objectives** Five general construction objectives were listed on the course evaluation questionnaire. The university means, standard deviations, and F-values for responses to the extent of difficulty that students experienced with the comprehension and application of principles involved in these general construction objectives are reported in Table 17.

There was significant difference among means at the .05 level for comprehension and at the .01 level for application of the principles involved in developing desirable work habits. The mean responses to difficulty experienced with comprehension ranged from 2.34 to 4.00 with the mean for University E being the highest and approaching uncertainty. The mean responses for the other four universities indicated that the students judged they were moderately certain that the comprehension of the principles in this objective was easy. The mean responses to the extent of difficulty experienced with application of the principles involved in developing desirable work habits ranged from 3.05 to 5.05. The mean for University E again was the highest and registered uncertainty. Other means indicated that students were moderately certain or approaching uncertainty regarding this aspect.
Table 17

Means, Standard Deviations, and F-values by University for Extent of Difficulty Students Experienced with Comprehension and Application of Principles Involved in General Construction Objectives

<table>
<thead>
<tr>
<th>Item</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean S</td>
<td>Mean S</td>
<td>Mean S</td>
<td>Mean S</td>
<td>Mean S</td>
<td></td>
</tr>
<tr>
<td>Comprehension</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1</td>
<td>2.47</td>
<td>2.27</td>
<td>2.63</td>
<td>1.75</td>
<td></td>
<td>2.93*</td>
</tr>
<tr>
<td>2</td>
<td>2.08</td>
<td>1.83</td>
<td>2.59</td>
<td>2.11</td>
<td></td>
<td>0.37</td>
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<tr>
<td>3</td>
<td>2.60</td>
<td>1.72</td>
<td>2.81</td>
<td>2.21</td>
<td></td>
<td>1.41</td>
</tr>
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<td>4</td>
<td>4.08</td>
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<td>3.52</td>
<td>2.39</td>
<td></td>
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<tr>
<td>5</td>
<td>2.94</td>
<td>1.99</td>
<td>3.04</td>
<td>2.12</td>
<td></td>
<td>2.46*</td>
</tr>
<tr>
<td>Application</td>
<td></td>
<td></td>
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<tr>
<td>1</td>
<td>3.45</td>
<td>2.31</td>
<td>4.00</td>
<td>2.23</td>
<td></td>
<td>4.08**</td>
</tr>
<tr>
<td>2</td>
<td>2.36</td>
<td>2.07</td>
<td>2.93</td>
<td>2.05</td>
<td></td>
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<td>2.25</td>
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<td>1.09</td>
</tr>
<tr>
<td>4</td>
<td>4.89</td>
<td>2.23</td>
<td>4.81</td>
<td>2.31</td>
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<td>3.51</td>
<td>2.00</td>
<td>4.07</td>
<td>2.36</td>
<td></td>
<td>3.87**</td>
</tr>
</tbody>
</table>

*Items: 1, developing desirable work habits; 2, using the sewing machine; 3, using fundamental hand stitches; 4, making adjustments in garments; 5, using proper techniques of pressing.

*Significant at the .05 level.

**Significant at the .01 level.

There was significant difference among means at the .05 level on the responses to the extent of difficulty experienced with comprehension of principles involved in using proper techniques of pressing, and at the .01 level for extent of difficulty experienced with application of pressing techniques. The mean responses for comprehension ranged from 2.26 to 3.76. In this instance, again, the mean for University E was the highest and indicated less certainty than students in the other universities that
the comprehension of principles involved in this objective was easy. The means of students' responses in the other universities indicated that students in Universities C and D were strongly certain while students in University B were moderately certain the comprehension of principles involved in this objective was easy. Regarding the difficulty experienced with the application of principles involved in using proper pressing techniques, the responses ranged from 2.74 to 4.62. Again the mean response for students in University E was the highest and indicated that they were uncertain as to whether the application was easy. Mean responses of the other four universities indicated that the students were either moderately certain or almost uncertain the application of principles involved in objective 5 was easy.

There was no difference among university means for the three remaining objectives with regard to difficulty experienced with either comprehension or application of principles involved in them. There were varying degrees of certainty that these items were easy, ranging from strongly certain to uncertain. In no instance did the university mean indicate the students were completely certain either aspect of the objective was easy.

**Specific garment construction objectives** The specific garment construction objectives, as listed on the course evaluation questionnaire, are shown in Table 18. Table 18 reports the means, standard deviations, and F-values for student responses to the extent of difficulty experienced with both the comprehension and application of the principles involved in the objectives in this category.
Table 18
Means, Standard Deviations, and F-values by University for Extent of Difficulty Students Experienced with Comprehension and Application of Principles Involved in Specific Garment Construction Objectives

<table>
<thead>
<tr>
<th>Item</th>
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<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F-value</td>
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<td>Mean</td>
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<td>1.85</td>
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<td>2.18</td>
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<td>1.84</td>
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<td>3.33</td>
<td>2.03</td>
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<td>3.81</td>
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<td>3.81</td>
<td>2.18</td>
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<td>3.33</td>
<td>1.99</td>
<td>4.19</td>
</tr>
</tbody>
</table>

**Significant at the .01 level.

*Significant at the .05 level.

Items: 1, using staystitching; 2, constructing darts; 3, constructing seams; 4, selecting appropriate seam finishes; 5, using interfacing; 6, using facings; 7, using trimming and clipping techniques; 8, using linings; 9, making hand worked buttonholes; 10, making bound buttonholes; 11, applying collars; 12, inserting sleeves; 13, constructing hems; 14, applying slide fasteners; 15, selecting and applying other fasteners.
As shown in Table 18, there was a significant difference at the .05 level among university mean responses to the extent of difficulty experienced with comprehension of the principles involved in using facings and at the .01 level for difficulty experienced with application of these principles. The mean responses ranged from 1.92 to 3.33. Visual inspection of the means for each university shows that students in Universities B and E were moderately certain and students in other universities were strongly certain that the comprehension of the principles involved in using facings was easy. The mean responses to difficulty experienced with the application of the principles involved in using facings ranged from 2.18 to 3.96. In this instance also the mean for University B registered almost uncertain and all others were either strongly certain or moderately certain the application of these principles was easy.

There was significant difference at the .01 level among university mean responses to the extent of difficulty experienced with both the comprehension and application of the principles involved in using linings. The mean responses for difficulty experienced with comprehension ranged from 2.42 to 4.48. Visual inspection of the means presented in Table 18 shows that students in Universities A, B, and E indicated they were almost uncertain that the comprehension aspect was easy, while students in University C were moderately certain it was easy, and those in University D were strongly certain it was easy. The mean responses to the extent of difficulty experienced with application of the principles involved in using linings ranged from 3.67 to 5.49, from moderately certain to uncertain that this aspect was easy. The mean for University B, 4.96, indicated uncertainty. During the interview with the instructor in
University B the researcher learned that students in that university were not expected to construct linings for garments. It appears that these students responded with uncertainty when they had no experience with an objective.

There was a difference significant at the .01 level among university mean responses to the extent of difficulty experienced with the application of principles involved in constructing hems. Mean responses ranged from 2.86 to 4.79. Visual inspection of the mean for each university presented in Table 18 shows that students in Universities B, C, and E were moderately certain, those in University A were approaching uncertainty, and those in University D were uncertain as to whether the application of principles involved in constructing hems was easy.

There was no significant difference among university mean responses to the extent of difficulty experienced with comprehension and application of principles involved in the other 12 objectives. It will be noted that mean responses, for the most part, indicated that there were varying degrees of certainty or uncertainty that principles were easy both to comprehend and apply. Exceptions to this were some of the means for objectives 9 and 10, both dealing with making buttonholes. The mean values were larger than 5.00 in Universities D and E for both the comprehension and application of principles involved in making hand worked buttonholes and for application of the principles in University A. For the principles involved in making bound buttonholes mean values greater than 5.00 were found for University E for both aspects of the objective and in University A for application. This finding indicates that there
was more evidence of difficulty experienced with these principles than with any other.

Students' judgments of reasons for difficulty experienced with aspects of the course

The students in each university cited reasons for difficulty experienced with some of the course objectives. A summary of responses is given in Table 19. Some students gave more than one reason to account for difficulty experienced. The majority of students in each university gave lack of previous experience with clothing construction as a reason for difficulties experienced with course objectives. A small proportion of students cited reasons other than lack of previous experience.

Table 19

Distribution of Students by University According to Reasons Given for Difficulties Experienced with Course Objectives

<table>
<thead>
<tr>
<th>Reasons given</th>
<th>Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Little or no previous experience</td>
<td>38</td>
</tr>
<tr>
<td>Insufficient time</td>
<td>3</td>
</tr>
<tr>
<td>Different methods from those</td>
<td></td>
</tr>
<tr>
<td>learned previously</td>
<td>4</td>
</tr>
<tr>
<td>Difficult projects</td>
<td>1</td>
</tr>
<tr>
<td>Little or no interest</td>
<td>5</td>
</tr>
<tr>
<td>Lack of effort</td>
<td>2</td>
</tr>
<tr>
<td>Lack of understanding</td>
<td></td>
</tr>
<tr>
<td>Lack of enjoyment</td>
<td></td>
</tr>
<tr>
<td>Lack of natural ability</td>
<td>3</td>
</tr>
<tr>
<td>Insufficient assistance</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>
The students also gave reasons why some members of the class found aspects of the course easy. A summary of responses is presented in Table 20. The response most frequently given to explain why some students experienced no difficulty with course objectives was previous experience in clothing construction.

**Table 20**

*Distribution of Students by University According to Reasons Given for No Difficulty Experienced with Course Objectives*

<table>
<thead>
<tr>
<th>Reasons given</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous experience</td>
<td>45</td>
<td>21</td>
<td>33</td>
<td>21</td>
<td>16</td>
</tr>
<tr>
<td>Natural ability</td>
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<td>2</td>
<td>1</td>
<td>3</td>
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</tr>
<tr>
<td>Good instruction</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Easy projects</td>
<td></td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Interest</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Extent to which course was judged to be too easy**

The students used a 9-point certainty scale in making an overall judgment of the extent to which the course was found to be too easy. The means showed that among Universities B (mean=2.67), C (mean=3.67), D (mean=3.54), and E (mean=2.76), the students responded with varying degrees of certainty that the course was not too easy, while the mean response of students in University A (mean=4.33) was approaching uncertainty. There was a significant difference among the means at the .01 level. The calculated F-value was 3.52 and the tabular value is 3.44 for 4 and 152 degrees of freedom. A significant difference at the .05 level was found between means for the four universities (F=2.80; F,.05=2.68 for 3, 126 d.f.).
Judged extent of learning of clothing construction experienced in the course

Responses to the item, I learned a great deal from this course, were made on a 9-point certainty scale. The mean responses for Universities B (8.26), C (7.83), D (7.21), and E (8.23) ranged from moderately certain to strongly certain the students judged they learned a great deal from the course. Students in University A (mean=6.11) were almost uncertain they learned a great deal from the course. There was a significant difference among the means at the .01 level (F=8.87; F,.01=3.44 for 5, 152 d.f.). A significant difference at the .01 level was found between the means for the four universities (F=9.25; F,.01=3.91 for 3, 126 d.f.).

Extent of enjoyment of sewing

Responses to the item, I like sewing very much, were made using a 9-point certainty scale. The means for all five universities indicated that students were moderately certain they enjoyed sewing. The means ranged from 7.63 to 7.86. There was no significant difference among the university means (F=0.06; F,.05=2.43 for 4, 152 d.f.).

During interviews with the instructors the researcher learned that student satisfaction or enjoyment of the course was an important objective in each university. It appears from the responses to this item that this objective was realized in all universities.

Practical ability in clothing construction

Practical ability in clothing construction was measured by scores on the garments constructed by students during the clothing construction portion of the elementary clothing course. In order to determine whether
the scoring of the garments by the instructors was consistent from university to university and, hence, whether garment scores could be used as criterion measures for all universities, the scores obtained for the sample garments were analyzed. As mentioned previously, two clothing construction instructors in each university scored the three sample garments. One of these instructors was responsible for the elementary clothing course.

For the factorial analysis of variance three methods of treatment of sample garment scores were used. The first method used the mean score of each garment for all garment construction characteristics that were applicable to the particular garment. The mean score for each garment using this method is reported in Table 21.

Table 21
Mean Scores of Sample Garments by Judge and by University: Method 1

<table>
<thead>
<tr>
<th>Garment</th>
<th>Universities</th>
</tr>
</thead>
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<td></td>
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</tr>
<tr>
<td>Dress</td>
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</tr>
<tr>
<td>Skirt</td>
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</tr>
<tr>
<td>Slacks</td>
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</tr>
<tr>
<td>Mean</td>
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</tbody>
</table>

^a_1 refers to the instructor in each university who was the participating instructor.

^b_2 refers to the second clothing instructor who scored the sample garments.

^c Means were calculated on 16 garment characteristics.

^d Means were calculated on 19 garment characteristics.

^e Means were calculated on 10 garment characteristics.

^f Means of all scores in each university.
Examination of the mean of all garment scores in each university as shown in Table 21 indicates that scores were higher in University D than in the other universities, and they were lowest in Universities B and E. The second instructor in Universities A, B, and C scored consistently higher than, or the same as, the first instructor while in Universities D and E the reverse was the case.

The summary of the results of the factorial analysis of variance for the first method is given in Table 22. The variation in scores among universities was significant at the .01 level and means that there was inconsistency in scoring among the five universities. The variation among garments types was significant at the .05 level.

Table 22
Analysis of Variance of Sample Garment Scores: Scoring Method 1

<table>
<thead>
<tr>
<th>Source</th>
<th>d.f.</th>
<th>M.S.</th>
<th>F&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Tabular F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.05</td>
</tr>
<tr>
<td>University</td>
<td>4</td>
<td>12057.4167</td>
<td>8.08**</td>
<td>3.84</td>
</tr>
<tr>
<td>Instructor</td>
<td>1</td>
<td>2288.1333</td>
<td>1.54</td>
<td>5.32</td>
</tr>
<tr>
<td>University-instructor</td>
<td>4</td>
<td>6129.8833</td>
<td>4.11*</td>
<td>3.84</td>
</tr>
<tr>
<td>interaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garment</td>
<td>2</td>
<td>6773.3333</td>
<td>4.55*</td>
<td>4.46</td>
</tr>
<tr>
<td>University-garment</td>
<td>8</td>
<td>1933.7917</td>
<td>1.34</td>
<td>3.44</td>
</tr>
<tr>
<td>interaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructor-garment</td>
<td>2</td>
<td>314.1333</td>
<td>0.21</td>
<td>4.66</td>
</tr>
<tr>
<td>interaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University-instructor-garment</td>
<td>8</td>
<td>1490.0083</td>
<td>0.21</td>
<td>4.66</td>
</tr>
</tbody>
</table>

<sup>a</sup>F-values were calculated by the formula M.S./error term. The error term was the mean square for university-instructor-garment interaction.

*Significant at the .05 level.

**Significant at the .01 level.
Table 21 shows that scores for the dress ranged from 6.00 to 7.94, for the skirt, 5.74 to 7.58, and for the slacks, 6.30 to 8.20. The highest range of scores was for the slacks and the lowest for the skirt. Interaction between university and teacher was significant at the .05 level. This is explained by the fact that there was inconsistency among universities in the relationship of the scores of the two instructors. In some cases the scores of the second instructor were higher than those of the first instructor, and in other cases they were lower.

The second method of treatment of scores used the mean score of the garment construction characteristics which were found to be common to all three garments. The mean score for each garment using this method is reported in Table 23.

Table 23

<table>
<thead>
<tr>
<th>Garment</th>
<th>Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A 1</td>
</tr>
<tr>
<td>Dress  c</td>
<td>7.12</td>
</tr>
<tr>
<td>Slacks  c</td>
<td>6.50</td>
</tr>
<tr>
<td>Mean    d</td>
<td>7.27</td>
</tr>
</tbody>
</table>

a 1 refers to the instructor in each university who was the participating instructor.
b 2 refers to the second clothing instructor who scored the sample garments.
c Means were calculated on 8 garment characteristics.
d Means of all scores in each university.
Examination of Table 23 shows that the mean of all garment scores in each university was highest for University D and lowest for University B. Using this method of treatment of scores gave a higher overall mean for all universities than the first method did. The garment characteristics on which the scores were calculated were those that were elementary and less difficult than those which were peculiar to each garment. This was probably the reason the scores were higher for these techniques. As noted in the discussion of the first method of treatment of scores, the second instructor in Universities A, B, and C scored consistently higher than, or the same as, the first instructor while in Universities D and E the reverse was the case.

The summary of results of the factorial analysis of variance for the second method of treatment of sample garment scores is reported in Table 24.

<table>
<thead>
<tr>
<th>Source</th>
<th>d.f.</th>
<th>M.S.</th>
<th>F^a</th>
<th>Tabular F .05</th>
<th>Tabular F .01</th>
</tr>
</thead>
<tbody>
<tr>
<td>University</td>
<td>4</td>
<td>7802.8667</td>
<td>3.84*</td>
<td>3.84</td>
<td>7.01</td>
</tr>
<tr>
<td>Instructor</td>
<td>1</td>
<td>4712.5333</td>
<td>2.32</td>
<td>5.32</td>
<td>11.26</td>
</tr>
<tr>
<td>University-instructor interaction</td>
<td>4</td>
<td>11396.5333</td>
<td>5.60*</td>
<td>3.84</td>
<td>7.01</td>
</tr>
<tr>
<td>Garment</td>
<td>2</td>
<td>6550.0333</td>
<td>3.22</td>
<td>4.46</td>
<td>8.65</td>
</tr>
<tr>
<td>University-garment interaction</td>
<td>8</td>
<td>2881.4917</td>
<td>1.42</td>
<td>3.44</td>
<td>6.03</td>
</tr>
<tr>
<td>Instructor-garment interaction</td>
<td>2</td>
<td>190.2333</td>
<td>0.09</td>
<td>4.46</td>
<td>8.65</td>
</tr>
<tr>
<td>University-instructor-garment interaction</td>
<td>8</td>
<td>2033.3583</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

^F-values were calculated by the formula M.S./error term. The error term was the mean square for university-instructor-garment interaction.

*Significant at the .05 level.
The variation in scores among universities was significant at the .05 level. For this method, also, there was evidence of inconsistency among the five universities. There was no significant difference among garments for this method, probably because the scores for the common construction details were used. Since these details were elementary there were fewer errors in these than in the details peculiar to each type of garment. There was university-teacher interaction among scores for this method as well, significant at the .05 level. This was due to the inconsistency among universities in the relationship of the scores of the two instructors. The scores of the second instructor were higher in some cases than were those of the first instructor and in other cases they were lower.

In the third method of treatment of garment scores the mean score of the garment construction characteristics which were unique to each garment were used. The mean score for each garment using this method is reported in Table 25. Examination of the mean of all garment scores using method 3 shows that in University D the instructors' mean score was higher than that of the other universities while the mean score for instructors in University B was lower than all others. Most of the scores were lower using this method than were the scores obtained using scoring method 1. The construction techniques on which the scores in method 3 were calculated were more discriminating and more difficult than were those used in method 2. These techniques included zipper application, collar construction and application, waistband treatment, sleeve construction and application, and buttonhole construction.
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UNIVERSITY MICROFILMS.
Table 26
Analysis of Variance of Sample Garment Scores: Scoring Method 3

<table>
<thead>
<tr>
<th>Source</th>
<th>d.f.</th>
<th>M.S.</th>
<th>( F^a )</th>
<th>Tabular ( F )</th>
</tr>
</thead>
<tbody>
<tr>
<td>University</td>
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<td>21806.8833</td>
<td>2.97</td>
<td>3.84</td>
</tr>
<tr>
<td>Instructor</td>
<td>1</td>
<td>750.0000</td>
<td>0.10</td>
<td>5.32</td>
</tr>
<tr>
<td>University-instructor interaction</td>
<td>4</td>
<td>4359.0833</td>
<td>0.59</td>
<td>3.84</td>
</tr>
<tr>
<td>Garment</td>
<td>2</td>
<td>7490.8000</td>
<td>1.02</td>
<td>4.46</td>
</tr>
<tr>
<td>University-garment interaction</td>
<td>8</td>
<td>4828.7583</td>
<td>0.66</td>
<td>3.44</td>
</tr>
<tr>
<td>Instructor-garment interaction</td>
<td>2</td>
<td>769.6000</td>
<td>0.10</td>
<td>4.46</td>
</tr>
<tr>
<td>University-instructor-garment interaction</td>
<td>8</td>
<td>7328.0583</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( a \) - \( F \)-values were calculated by the formula \( M.S./error \) term. The error term was the mean square for university-instructor-garment interaction.

Because of the variations found among sample garment scores using different methods of treatment of scores, the scores of the students' garments were believed to be inconsistent. For this reason scores on garments constructed by the students were not used as criterion measures for the universities combined. They were used in correlational analysis for each individual university.

Weights Assigned Predictors and Criteria

Results of intercorrelations of the five judges' ratings of the relative importance of the predictors are presented in Table 27. The finding that all correlations between judges were significant above the .01 level meant that there was agreement among the five judges regarding the importance of the predictors.
Table 27

Intercorrelations among Judges' Ratings of Predictors

<table>
<thead>
<tr>
<th>Judge</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>91**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>90**</td>
<td>95**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>84**</td>
<td>91**</td>
<td>84**</td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>76**</td>
<td>89**</td>
<td>90**</td>
<td>81**</td>
<td></td>
</tr>
</tbody>
</table>

*aDecimal points for this and all subsequent tables reporting correlations have been deleted.

**For 12 d.f., r=± 66 is significant at the 01 level.

Results of intercorrelations of the judges' ratings of the relative importance of criteria are given in Table 28. For the criterion measures the ratings of Judge 5 did not correlate highly enough with three of the other judges; therefore, the ratings of Judge 5 were not used for determining criterion weights.

Table 28

Intercorrelations among Judges' Ratings of Criteria

<table>
<thead>
<tr>
<th>Judge</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>97**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>76</td>
<td>81*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>90**</td>
<td>92**</td>
<td>86*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>35</td>
<td>38</td>
<td>84*</td>
<td>55</td>
<td></td>
</tr>
</tbody>
</table>

*For 4 d.f., r=± 81 is significant at the 05 level.

**For 4 d.f., r=± 92 is significant at the 01 level.
There were three of the predictor variables listed on the instrument used for obtaining judges' ratings of predictors and criteria (Appendix I) which were eliminated from further analysis because the number of students who responded to them was small. These were as follows: learning clothing construction from a sewing machine company, learning clothing construction from an experienced tailor, and learning clothing construction from an experienced seamstress.

The ratings of the judges on each remaining variable were converted to normal deviates using a normal curve table. The mean of the normal deviates for each variable was calculated. Table 41 in Appendix J reports each judge's rating for each predictor, the corresponding normal deviates, and the mean normal deviate. Table 42 in Appendix J gives the corresponding information for the criteria. Negative values for normal deviates were obtained in six cases in which the judges' ratings were less than 50 percent certain. When the judges were not more than 50 percent certain that the predictor or criterion was important, that predictor or criterion was not included in the analysis of these variables. The mean normal deviates which had positive values were used as weights in the correlation analysis. A weight of zero was assigned for all negative values.

Comparison of Courses

As stated previously one of the objectives of this research was to describe beginning clothing construction offerings at five universities located in the Maritime Provinces of Canada and providing home economics degree programs. In order to achieve this objective a comparison of courses was made. The data for this comparison were obtained from the
university calendar for each university, interviews with each instructor of clothing construction, the course objectives questionnaire (See Appendix B.), the course evaluation questionnaire (See Appendix H.), and the item analysis of the responses to the 98-item posttest (A copy of the test is included in Appendix D.).

Class time schedule

Table 29 presents the amount of time scheduled for the clothing construction segment of the elementary clothing course in each of the five universities.

Table 29
Class Time Scheduled for Clothing Construction

<table>
<thead>
<tr>
<th>Universities</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours per week per semester</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Number of semesters</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

For comparison purposes the amount of time scheduled for clothing construction can be expressed in semester hours. The number of semester hours is calculated by multiplying the number of hours scheduled per week by the number of semesters the course is scheduled. Universities A and E had equivalent amounts of time scheduled for clothing construction, six semester hours; Universities B and D had four semester hours each; while University C had three semester hours. This shows variations among universities in the amount of time allotted to clothing construction in the beginning clothing course.
In the first interview with the participating instructor in each university, the paper-and-pencil test was examined to see if any items were considered inappropriate for students in clothing construction classes in that university. The responses of the instructors indicated that in all universities except University B there was no item which seemed inappropriate. The instructor in University B indicated that students in that university were not expected to learn principles involved in lining garments. This information indicated that the behavioral objectives involved in the test items were representative of the objectives of the course, with the exception of the item dealing with linings in University B. The test was then a valid measure of attainment of the course objectives.

Identification of common behavioral objectives

In order to determine if there were objectives for the clothing construction portion of the elementary clothing course that were common to the five participating universities, the responses to the course objectives questionnaire, the course evaluation questionnaire, and the posttest were examined. Objectives that were believed to be appropriate for an elementary clothing construction course at the university level were categorized on the course objectives questionnaire and the course evaluation questionnaire as preconstruction objectives, general objectives applied to garment construction, and specific objectives involved in the processes of garment construction. The objectives were itemized within each category and responses were obtained for two behavioral aspects, that
is, for comprehension and application of the principles involved in each objective.

In this section the data for three variables are presented and discussed. The first variable is the extent of emphasis the instructors placed on the comprehension and application of principles involved in each objective. As stated previously the extent of emphasis was expressed according to the following 9-point rating scale:

```
1 2 3 4 5 6 7 8 9
Completely Certain NOT EMPHASIZED
Uncertain whether emphasized or not Completely Certain it IS EMPHASIZED
```

The measure used for the second variable was the means of students' responses for each university regarding the extent of difficulty experienced with both comprehension and application of principles. The students responded according to the following 9-point rating scale:

```
1 2 3 4 5 6 7 8 9
Completely Certain it was EASY
Uncertain whether it was EASY or DIFFICULT Completely Certain it was DIFFICULT
```

Any significant differences between universities on means of students' responses are discussed. The third variable was the performance of the students on the items on the posttest dealing with each objective itemized on the questionnaire as expressed in difficulty indices.

In interpreting the responses to both questionnaires the ratings of 1 and 9 were considered to register complete certainty, 2 and 8 were
considered strongly certain, 3 and 7 were moderately certain, 4 and 6 were considered to be bordering on uncertainty, and 5 meant uncertainty. The degree of certainty of the instructor regarding emphasis was interpreted to mean the degree of importance attached to the objectives. The degree of certainty of students regarding difficulty experienced was interpreted to mean extent of difficulty.

It was expected that, in general, if the instructors responded that an objective was emphasized, the students would experience little difficulty with the corresponding learning experiences, and a high percentage of students would respond correctly to the items on the posttest corresponding to the objective. It was assumed that the test items were truly representative of the learning involved in the objectives.

Regarding the posttest, as discussed previously, 52 items were found to have similar percentages of students responding correctly in all universities, and 69 items were found to be common to Universities A, C, D, and E using the same criterion of percentage of correct responses. There was a maximum of approximately 30 points between the highest difficulty index and the lowest difficulty index of each of the items which were included in the 52-item test and the 69-item test.

Preconstruction objectives Twelve objectives from the questionnaires were identified as preconstruction objectives. Profiles of the instructors' responses to the extent of emphasis placed on the comprehension of principles involved in the preconstruction objectives are shown in Figure 1. Profiles of the instructors' responses to the extent of emphasis placed on the application of principles involved in preconstruction objectives are shown in Figure 2. Scattergrams showing
Preconstruction objectives

Preconstruction objectives are: 1, choosing equipment; 2, taking body measurements; 3, checking pattern type and size; 4, choosing the pattern; 5, selecting correct yardage; 6, understanding the pattern; 7, altering the pattern; 8, preparing the fabric before cutting; 9, placing the pattern on the fabric; 10, pinning the pattern to the fabric; 11, cutting out the garment pieces; 12, marking the garment pieces.

Figure 1. Profile of instructors' responses to the extent of emphasis placed on comprehension of principles involved in preconstruction objectives
Preconstruction objectives

Preconstruction objectives are: 1, choosing equipment; 2, taking body measurements; 3, checking pattern type and size; 4, choosing the pattern; 5, selecting correct yardage; 6, understanding the pattern; 7, altering the pattern; 8, preparing the fabric before cutting; 9, placing the pattern on the fabric; 10, pinning the pattern to the fabric; 11, cutting out the garment pieces; 12, marking the garment pieces.

Figure 2. Profile of instructors' responses to the extent of emphasis placed on the application of principles involved in preconstruction objectives.
students' responses to difficulty experienced with principles involved in each objective plotted against instructors' responses regarding emphasis of these objectives are shown in Figures 3, 4, 5, and 6. Table 30 presents the preconstruction objectives, the numbers of the test items which measured cognitive achievement pertaining to each, the items which were included in the 52-item test and 69-item test, and the percentage of students who responded correctly to each item in each university and in the five universities combined.

Visual inspection of Figures 1 and 2 shows that no preconstruction objective received a rating of 9 (completely certain of emphasis) from all five instructors. It was found that instructors responded with moderate to complete certainty that emphasis was placed on both comprehension and application of eight of the preconstruction objectives (2, 3, 5, 6, 9, 10, 11, and 12). The data presented in Figures 3, 4, 5, and 6 show that on all of these eight objectives the students' responses were strongly certain to moderately certain that both aspects were found to be easy.

The posttest results for items dealing with some of the objectives, as given in Table 30, are discussed here. The test item dealing with Objective 2, taking body measurements, was eliminated from both the 52- and 69-item tests because of the wide range of difficulty indices. While the difficulty indices were satisfactory, ranging from 57 to 83, there were differences among universities in the percentage of students who responded correctly to the item. Of the two test items dealing with Objective 3, checking pattern type and size, one was included in the 69-item test. The item dealing with Objective 5, selection of correct
Figure 3. Instructors' responses to extent of emphasis placed on comprehension and application of principles involved in preconstruction objectives 1, 2, and 3 plotted against means of students' responses by university to the extent of difficulty experienced with both behavioral aspects of these principles

1 - choosing equipment
2 - taking body measurements
3 - checking pattern type and size
Figure 4. Instructors' responses to extent of emphasis placed on comprehension and application of principles involved in preconstruction objectives 4, 5, and 6 plotted against means of students' responses by university to the extent of difficulty experienced with both behavioral aspects of these principles

4 - choosing the pattern
5 - selecting correct yardage
6 - understanding the pattern
Comprehension

Application

Instructor
Figure 5. Instructors' responses to extent of emphasis placed on comprehension and application of principles involved in preconstruction objectives 7, 8, and 9 plotted against means of students' responses by university to the extent of difficulty experienced with both behavioral aspects of these principles

7 - altering the pattern
8 - preparing the fabric before cutting
9 - placing the pattern on the fabric
Figure 6. Instructors' responses to extent of emphasis placed on comprehension and application of principles involved in preconstrution objectives 10, 11, and 12 plotted against means of students' responses by university to the extent of difficulty experienced with both behavioral aspects of these principles

10 - pinning the pattern to the fabric
11 - cutting out the garment pieces
12 - marking the garment pieces
Table 30
Preconstruction Objectives, Numbers of the Test Items Corresponding to Each, Test Items Included in the 52- and 69-item Tests, Difficulty Indices of Each Test Item for Each of Five Universities and for Five Universities Combined

<table>
<thead>
<tr>
<th>Objective&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Test&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Included in 52-item test</th>
<th>Included in 69-item test</th>
<th>Difficulty indices for universities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>number</td>
<td>test</td>
<td>test</td>
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<td>9</td>
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<td>x</td>
<td>x</td>
<td>85</td>
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<tr>
<td>29</td>
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<sup>a</sup>1, choosing equipment; 2, taking body measurements; 3, checking pattern type and size; 4, choosing the pattern; 5, selecting correct yardage; 6, understanding the pattern; 7, altering the pattern; 8, preparing the fabric before cutting; 9, placing the pattern on the fabric; 10, pinning the pattern to the fabric; 11, cutting out the garment pieces; 12, marking the garment pieces.

<sup>b</sup>Item numbers refer to test items on the test in Appendix D.
yardage, was not included in either the 52- or 69-item test. The difficulty index of this item for University E was lower than for the others and was outside the band defining the pool of common items. In University E a smaller proportion of students responded correctly to this test item than in the other universities although the students indicated they found little difficulty with either the comprehension or application of the principles involved in selecting correct yardage. Most of the test items dealing with Objectives 6 and 9, understanding the pattern and placing the pattern on the fabric, were retained in the 52- and 69-item tests. There was no test item dealing with Objective 10, pinning the pattern to the fabric. The test item pertaining to Objective 11, cutting out garment pieces, was retained in the 69-item test. The difficulty index for University B for this item was lower than for other universities and was outside the band defining the pool of common items. Of the three items dealing with Objective 12, marking the garment pieces, one was retained in the 52- and 69-item tests. The difficulty indices of the two items that were omitted were satisfactory but the range was wide.

Examination of instructors' responses as presented in Figure 1 showed that in Universities C, D, and E, the comprehension of the principles involved in Objective 1, choosing equipment, was strongly emphasized. In Universities A and B the instructors responded that they were uncertain if it was emphasized. One explanation for the uncertainty as to whether the objective was emphasized could be that the instructors had considered that learning to choose equipment was unimportant. In these two universities the instructors may have assumed that the students had prior learning regarding this objective. Regarding the application of the principles
involved in choosing equipment, as shown in Figure 2, the instructor in University C indicated it was strongly emphasized, instructors in Universities B and D were uncertain, and instructors in Universities A and E indicated with moderate to complete certainty that it was not emphasized. One explanation of the lack of emphasis on the experience of selecting equipment could be that small equipment may have been provided by the department in Universities A and E so that the students were not expected to select their own.

Students' responses to the extent of difficulty experienced with choosing equipment, as shown in Figure 3, indicated that in all universities the students indicated they experienced little difficulty with either the comprehension or application of principles involved in this objective. Even in the universities where the instructors expressed uncertainty about the emphasis placed on either behavioral aspect, there was no evidence of uncertainty among the students. Nor was there evidence of difficulty perceived by the students in the universities where no emphasis was indicated by the instructors. In the latter two situations the students may have had previous learning or they may have been unaware of specifications for equipment. If they selected equipment, they may have done so without discrimination. There was no item on the 98-item test dealing with choice of equipment.

As shown in Figure 1, the instructor in University A responded that she was uncertain if the comprehension of the principles involved in Objective 4, choosing a pattern, was emphasized. The four remaining instructors were at least moderately certain that comprehension was emphasized. Figure 4 shows that the students in all but University E judged this
aspect of the objective at least moderately easy. There was a highly significant difference between universities on the mean judgments of difficulty ($F=4.14; F_{0.01}=3.44$ for 4, 152 d.f.). The mean response was highest for students in University E (3.62) indicating they were approaching uncertainty about difficulty with the objective. Although in University A the instructor indicated uncertainty about emphasis, the student mean response (2.17) indicated that the comprehension of the principles involved in this objective was considered easy.

Instructors in all five universities were at least moderately certain that emphasis was placed on the application of the principles involved in Objective 4, pattern selection, as Figure 2 indicates. There was a significant difference at the .01 level between universities on the means ($F=4.67; F_{0.01}=3.44$ for 4, 152 d.f.). In all universities except University E the students indicated that the application of the principles involved in choosing a pattern was at least moderately easy.

There was one item on the paper-and-pencil test dealing with Objective 4, but it was eliminated because the range of difficulty indices was wide (See Table 30.). Fewer students in Universities D and E responded correctly to the item than did those in the other three universities. Although the students in University D responded they did not experience difficulty with the comprehension of the principles related to Objective 4, fewer than 50 percent of them responded correctly to the test item. Students in University E indicated they experienced more difficulty with both aspects of this objective than other students, and fewer (33 percent) responded correctly to the test item. In University A 81 percent of the
students responded correctly to the test item even though the instructor indicated uncertainty about emphasis on comprehension.

Visual inspection of Figures 1 and 2 shows that the instructors in all five universities responded, with varying degrees of certainty, that comprehension of principles involved in Objective 7, altering the pattern, was emphasized, and all except the instructor in University E responded that application was emphasized. The latter instructor responded that she was approaching uncertainty about emphasis on this objective. The means of students' responses, as shown in Figure 5, indicate that students in University E were uncertain about difficulty with both comprehension and application of Objective 7. There was a significant difference at the .05 level between universities on the means ($F=3.32; F_{0.05}=2.43$ for 4, 152 d.f.) regarding the extent of difficulty with application. Table 30 shows that there were three test items on the 98-item test (24, 25, and 26) dealing with Objective 7. Items 24 and 26 were retained on both the 52- and 69-item tests; however, the difficulty indices of item 24 were low, ranging from 18 to 46 percent.

As Figures 1 and 2 indicate, the instructor in University B responded that she was almost uncertain that comprehension of principles involved in Objective 8, preparing fabric before cutting, was emphasized, while the responses of all other instructors showed that they were either strongly certain or completely certain of emphasis being placed on both behavioral aspects. The students' mean responses as shown in Figure 5 indicate that in all universities the students responded they were either strongly certain or moderately certain that both aspects were easy. There was one item on the original test dealing with preparation of fabric before cutting.
This item was not included in either the 52- or 69-item test because the percentage of students in University D who responded correctly to the item was lower than in the other universities and was outside the band defining the pool of common items. While students in University D responded they judged the objective easy, only a small percentage of them gave the correct response to the corresponding test item.

**General clothing construction objectives**

Five objectives were classified as general clothing construction objectives on both the course objectives questionnaire and course evaluation questionnaire. Profiles of instructors' responses to the extent of emphasis placed on the comprehension of the principles involved in these objectives are shown in Figure 7. Figure 8 shows instructors' responses pertaining to the application of the principles. Figures 9 and 10 present by university the means of students' responses to the extent of difficulty experienced with comprehension and application of the principles involved in these five objectives plotted against the instructors' responses regarding emphasis. Table 31 identifies the test items of the original paper-and-pencil test related to each objective, the items included in the 52- and 69-item tests, as well as the difficulty indices of each item for each university and for the five universities combined.

By visual inspection of Figures 7 and 8 it was found that the instructors responded with varying degrees of certainty that emphasis was placed on comprehension and application of principles involved in general clothing construction Objectives 1, 2, and 5. On both the comprehension and application of principles involved in Objectives 3 and 4 there were
1, developing desirable work habits; 2, using the sewing machine; 3, using fundamental hand stitches; 4, making adjustments in garments; 5, using proper techniques of pressing.

Figure 7. Profile of instructors' responses to extent of emphasis placed on comprehension of principles involved in general clothing construction objectives.
General clothing construction objectives

1, developing desirable work habits; 2, using the sewing machine; 3, using fundamental hand stitches; 4, making adjustments in garments; 5, using proper techniques of pressing.

Figure 8. Profile of instructors' responses to extent of emphasis placed on application of principles involved in general clothing construction objectives
Figure 9. Instructors' responses to extent of emphasis placed on comprehension and application of principles involved in general clothing construction objectives 1, 2, and 3 plotted against means of students' responses by university to the extent of difficulty experienced with both behavioral aspects of these principles

1 - developing desirable work habits
2 - using the sewing machine
3 - using fundamental hand stitches
Comprehension

Application

Instructor
Figure 10. Instructors' responses to extent of emphasis placed on comprehension and application of principles involved in general clothing construction objectives 4 and 5 plotted against means of students' responses by university to the extent of difficulty experienced with both behavioral aspects of these principles

4 - making adjustments in garments
5 - using proper techniques of pressing
Comprehension

Application

Instructor
Table 31

General Construction Objectives, Numbers of the Test Items Corresponding to Each, Test Items Included in the 52- and 69-item Tests, Difficulty Indices of Each Test Item for Each of Five Universities and for Five Universities Combined

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\(^a\)1, developing desirable work habits; 2, using the sewing machine; 3, using fundamental hand stitches; 4, making adjustments in garments; 5, using proper techniques of pressing.

\(^b\)Numbers correspond to the numbers of the items on the 98-item test included in Appendix D.
differences of opinion ranging from completely certain the objective was not emphasized to completely certain it was emphasized.

Figure 9 shows that for Objective 1, developing desirable work habits, the students' mean responses ranged from 2.34 to 4.00 for extent of difficulty experienced with comprehension and 3.05 to 5.05 for application. There was significant difference at the .05 level among universities on the means for comprehension ($F=2.93; F_{0.05}=2.43$ for 4, 152 d.f.) and at the .01 level for application ($F=4.08; F_{0.01}=3.44$ for 4, 152 d.f.). The mean for University E was the highest, approaching uncertainty for comprehension and registering uncertainty for application, but the instructor in this university responded with certainty that emphasis was placed on both aspects. There may have been some misunderstanding on the part of students in University E regarding the meaning of work habits, or there may have been so much emphasis placed on this objective by the instructor that the students were aware of their deficiencies in regard to work habits.

There was no test item dealing specifically with developing desirable work habits, but in the test items dealing with unit method of construction (items 37-48) work habits were implied. Table 31 shows that more than 50 percent of the students in all universities responded correctly to seven of these 12 test items. On only two of these items the difficulty index in University E was below 50 percent. It appears that although students in University E registered uncertainty about difficulty experienced with developing desirable work habits, over 50 percent responded correctly to 10 items. On seven of these items there were 67 to 100 percent who responded correctly. There were six of the 12 items
which were included in the 52-item test and eight were included in the 69-item test.

Inspection of the mean student responses shown in Figure 9 indicates that there was agreement among universities that students judged that both comprehension and application of principles involved in Objective 2, using the sewing machine, were easy. Of the eight items on the 98-item paper-and-pencil test dealing with using the sewing machine, four were included in the 52-item test and seven were included in the 69-item test as shown in Table 31.

While the student mean responses (See Figure 10.) indicated that there were varying degrees of certainty that comprehension of principles involved in Objective 5, using proper techniques of pressing, was easy, there was significant difference at the .05 level among mean responses ($F=2.46$; $F_{0.05}=2.43$ for 4, 152 d.f.). The mean response for students in University E was the highest, 3.76, indicating that these students were less certain than others that the comprehension of this objective was easy. Student mean responses to difficulty experienced with the application of the principles of proper pressing were significantly different among universities at the .01 level ($F=3.87$; $F_{0.01}=3.44$ for 4, 152 d.f.). The means for Universities B and E were over 4.00 and indicated that the students were close to uncertain about difficulty. There were five test items dealing with pressing techniques as Table 31 shows. One of these five items was included in the 52-item test and three were included in the 69-item test.

Data in Figures 9 and 10 revealed wide variation among instructors' responses to the extent of emphasis placed on both behavioral aspects of
Objective 3, using fundamental hand stitches. Data for individual universities show that in University A, the instructor was completely certain no emphasis was placed on either comprehension or application of this objective, and the instructor in University E was uncertain about whether emphasis was placed on application. The mean of students' responses (See Figure 9.) shows that in University A students were moderately certain that both the comprehension and application were easy. In University E the instructor was uncertain as to whether emphasis was placed on application of principles involved in this objective, and students in that university indicated they were uncertain about this aspect. There were five items on the 98-item test dealing with using fundamental hand stitches as shown in Table 31. In University E there were 60 to 70 percent of the students who responded correctly to these items, and 28 to 72 percent of the students in University A responded correctly. There were two of these test items included in the 52-item test and three in the 69-item test.

Examination of Figure 10 shows that in University A the instructor responded she was completely certain emphasis was not placed on either the comprehension or application of the principles involved in Objective 4, making adjustments in garments, and the students' mean response in this university was approaching uncertainty regarding extent of difficulty experienced with both behavioral aspects. One explanation of this finding could be that emphasis was placed on alterations of the pattern prior to garment construction, and the need for making garment alterations was reduced. In University E, as shown in Figure 10, the instructor responded she was uncertain if emphasis was placed on the application of principles.
involved in making adjustments in garments, and the mean of students' responses was approaching uncertainty. There was no item on the 98-item test dealing with this objective.

Specific garment construction objectives Fifteen specific objectives involved in garment construction were in both the course objectives questionnaire and the course evaluation questionnaire. Figures 11 and 12 show the profiles of instructors' responses to the extent of emphasis placed on comprehension and application of principles involved in these objectives. Figures 13, 14, 15, 16, and 17 present in graphic form the means of students' responses by university to the extent of difficulty experienced with both behavioral aspects of principles plotted against the instructors' responses to the extent of emphasis placed on these aspects. Table 32 identifies the test items on the paper-and-pencil test corresponding to each objective, the items included in the 52- and 69-item tests, and the difficulty indices of each item for each university and for the five universities combined.

Visual inspection of Figures 11 and 12 shows that the instructors responded with varying degrees of certainty that emphasis was placed on both the comprehension and application of principles involved in Objectives 2, 7, 12, 13, and 14. The data given in Figures 13, 15, 16, and 17 indicate that there were only two of these five objectives that the students in all universities judged, with at least moderate certainty, to be easy regarding both comprehension and application. These were Objectives 2, constructing darts, and 7, using trimming and clipping techniques. Data presented in Table 32 show that there was no test item dealing with
Specific garment construction objectives

1. using staystitching; 2. constructing darts; 3. constructing seams; 4. selecting appropriate seam finishes; 5. using interfacing; 6. using facings; 7. using trimming and clipping techniques; 8. using linings; 9. making hand worked buttonholes; 10. making bound buttonholes; 11. applying collars; 12. inserting sleeves; 13. constructing hems; 14. applying slide fasteners; 15. selecting and applying other fasteners.

Figure 11. Profile of instructors' responses to extent of emphasis placed on comprehension of principles involved in specific garment construction objectives
Specific garment construction objectives

1. using staystitching; 2. constructing darts; 3. constructing seams; 4. selecting appropriate seam finishes; 5. using interfacing; 6. using facings; 7. using trimming and clipping techniques; 8. using linings; 9. making hand worked buttonholes; 10. making bound buttonholes; 11. applying collars; 12. inserting sleeves; 13. constructing hems; 14. applying slide fasteners; 15. selecting and applying other fasteners.

Figure 12. Profile of instructors' responses to extent of emphasis placed on application of principles involved in specific garment construction objectives
Figure 13. Instructors' responses to extent of emphasis placed on comprehension and application of principles involved in specific garment construction objectives 1, 2, and 3 plotted against means of students' responses by university to extent of difficulty experienced with comprehension and application of these principles

1 - using staystitching
2 - constructing darts
3 - constructing seams
Figure 14. Instructors' responses to extent of emphasis placed on comprehension and application of principles involved in specific garment construction objectives 4, 5, and 6 plotted against means of students' responses by university to extent of difficulty experienced with comprehension and application of these principles

- 4 - selecting appropriate seam finishes
- 5 - using interfacing
- 6 - using facings
Figure 15. Instructors' responses to extent of emphasis placed on comprehension and application of principles involved in specific garment construction objectives 7, 8, and 9 plotted against means of students' responses by university to extent of difficulty experienced with comprehension and application of these principles

7 - using trimming and clipping techniques
8 - using linings
9 - making hand worked buttonholes
Figure 16. Instructors' responses to extent of emphasis placed on comprehension and application of principles involved in specific garment construction objectives 10, 11, and 12 plotted against means of students' responses by university to extent of difficulty experienced with comprehension and application of these principles

10 - making bound buttonholes
11 - applying collars
12 - inserting sleeves
Instructor
Figure 17. Instructors' responses to extent of emphasis placed on comprehension and application of principles involved in specific garment construction objectives 13, 14, and 15 plotted against means of students' responses by university to extent of difficulty experienced with comprehension and application of these principles

13 - constructing hems
14 - applying slide fasteners
15 - selecting and applying other fasteners
Table 32
Specific Garment Construction Objectives, Numbers of the Test Items Corresponding to Each, Test Items Included in the 52- and 69-item Tests, Difficulty Indices of Each Test Item for Each of Five Universities and for Five Universities Combined

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<sup>a</sup>1, using staystitching; 2, constructing darts; 3, constructing seams; 4, selecting appropriate seam finishes; 5, using interfacing; 6, using facings; 7, using trimming and clipping techniques; 8, using linings; 9, making hand worked buttonholes; 10, making bound buttonholes; 11, applying collars; 12, inserting sleeves; 13, constructing hems; 14, applying slide fasteners; 15, selecting and applying other fasteners.

<sup>b</sup>Numbers correspond to the numbers of the items on the test included in Appendix D.
Table 32 (Continued)

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Objective 2. Of the four items pertaining to Objective 7, only one was included in both the 52- and 69-item tests.

Figure 16 shows that in all universities the students judged with at least moderate certainty that the comprehension of principles involved in Objective 12, inserting sleeves, was easy while they responded they were either moderately certain or close to uncertain regarding the easiness of application. There were two items on the 98-item test dealing with inserting sleeves and both were retained on the 52- and 69-item tests.

There was significant difference at the .05 level between universities on the means in response to the extent of difficulty experienced with application of principles involved in Objective 13, constructing hems (F=3.08; F.05=2.43 for 4, 152 d.f.). The mean response for University D (See Figure 17.) indicated that there was uncertainty about difficulty experienced with application of principles involved in constructing hems.
Of the six items on the original test pertaining to constructing hems, three were included in the 52-item test and four in the 69-item test.

Figure 17 shows that students responded they were moderately certain or almost uncertain about the easiness of comprehension of principles involved in Objective 14, applying slide fasteners, and almost uncertain regarding application. The one item on the paper-and-pencil test dealing with this objective was retained on the 52- and 69-item tests. The difficulty indices ranged from 24 to 50 percent.

Visual inspection of Figures 11 and 12 shows that all instructors except the instructor in University B responded with varying degrees of certainty that emphasis was placed on comprehension and application of principles involved in Objectives 1, 3, 5, 8, and 11. The instructor in University B was almost uncertain about emphasis on comprehension and application involved in Objectives 1, 5, and 8; almost uncertain about emphasis on comprehension in Objective 3; and uncertain about emphasis on application involved in Objective 11.

Students' responses to the extent of difficulty experienced with Objective 1, using staystitching, and Objective 3, constructing seams, as shown in Figure 13, indicated that in all five universities students judged both comprehension and application to be easy. As Table 32 indicates, there were two items on the paper-and-pencil test dealing with staystitching, one of which was included in both the 52- and 69-item tests. One of the three test items dealing with Objective 3, constructing seams, was included in the 52-item test, and two of the three items were included in the 69-item test.

Figure 14 shows that students responded they were moderately certain
that both comprehension and application of principles involved in Objective 5, using interfacing, were easy. Of the two items on the original test dealing with this objective, none was on the 52-item test and one was included in the 69-item test.

As mentioned above, the instructor in University B responded that she was uncertain about the emphasis placed on both the comprehension and application of the principles involved in Objective 8, using linings. On the interview questionnaire this instructor responded that students in that university did not use linings; therefore, this objective was not included in the course. As Figure 15 shows, the students' mean responses to the extent of difficulty experienced with both aspects of this objective ranged from moderately certain to uncertain. There was significant difference at the .01 level between universities on the means for both behavioral aspects (F=3.80 for comprehension, F=4.52 for application; F,01=3.44 for 4, 152 d.f.). On the original test there was one item dealing with linings, and this was retained in both the 52- and 69-item tests. The difficulty index for University B was lower than for other universities.

Figure 16 shows that students responded they were moderately certain to almost uncertain about the easiness of comprehension of principles involved in Objective 11, applying collars, and almost uncertain to uncertain regarding easiness of application. There were two test items on the paper-and-pencil test dealing with application of collars; one was retained on the 69-item test only.

Figure 11 shows that instructors in all five universities responded that at least moderate emphasis was placed on comprehension of principles
involved in Objective 4, selection of appropriate seam finishes, and Figure 12 shows that only the instructor in University E was almost uncertain regarding emphasis placed on application. Figure 14 shows that students responded they were moderately certain that both behavioral aspects of this objective were easy. The mean response for both aspects for University E indicated that in that university the students were less certain than the others regarding easiness. Of the three items dealing with Objective 4, two were on the 52-item test, and all three were included in the 69-item test.

As shown in Figures 11 and 12, the instructor in University A responded she was uncertain as to whether emphasis was placed on both comprehension and application of principles involved in Objective 6, using facings. Other instructors indicated with varying degrees of certainty that both learning aspects were emphasized. Student responses to the extent of difficulty experienced with this objective, as shown in Figure 14, indicated that both learning aspects were judged to be easy with certainty ranging from strong to almost uncertain. There was a significant difference between universities on the means at the .05 level for comprehension \((F=3.19; F_{0.05}=2.43 \text{ for } 4, 152 \text{ d.f.})\). The mean response for University A indicated that the students in that university were strongly certain that comprehension was easy and moderately certain that application was easy. There were four items on the paper-and-pencil test dealing with using facings as Table 32 shows. Two of these were included in the 52-item test and three in the 69-item test.

The data in Figure 11 indicate that the instructor in University B responded that she was almost uncertain as to whether emphasis was placed
on the comprehension of principles involved in Objective 15, selection and application of fasteners other than slide fasteners. All other instructors responded with varying degrees of certainty that this aspect was emphasized. The means of students' responses to the extent of difficulty experienced with comprehension of the principles involved in Objective 15, as shown in Figure 17, ranged from 2.87 to 4.19, that is, from moderately certain this learning aspect was easy to almost uncertain as to whether it was easy.

Figure 12 shows that the instructor in University C responded that she was uncertain if the application of principles involved in using fasteners was emphasized; the instructor in University E was almost uncertain; but the instructors in the other universities responded they were either moderately certain or strongly certain of emphasis. There were seven items on the original test dealing with fasteners, and three of these were included in the 52-item test and four in the 69-item test.

As Figures 11 and 12 show, there was wide variation among the instructors' responses to the extent of emphasis placed on both behavioral aspects of Objective 9, making hand worked buttonholes. Instructors in both Universities A and D responded with certainty that both learning aspects were not emphasized. This implies that these two instructors considered this method of making buttonholes unimportant. Instructors in Universities B, C, and E responded with varying degrees of certainty that emphasis was placed on comprehension of principles involved in Objective 9 and with less certainty regarding emphasis on application.

The students' mean responses as shown in Figure 15 were almost uncertain to uncertain as to whether the objective was easy or difficult. Means for Universities A and D indicated that the students were uncertain
whether the objective was easy or difficult. Assuming that students responded with uncertainty when they had no experience with the objective, the students and the instructors in Universities A and D were in agreement that this objective was not included in the course. There was no test item dealing with this objective.

As Figures 11 and 12 show, the instructor in University A responded with complete certainty that both comprehension and application of principles involved in Objective 10, making bound buttonholes, were not emphasized; the instructor in University C responded she was uncertain regarding extent of emphasis placed on application; and all other responses indicated there were varying degrees of certainty regarding emphasis. Figure 16 shows that the students' mean responses were either almost uncertain or uncertain regarding extent of difficulty experienced with both comprehension and application of principles involved in making bound buttonholes. There were two items on the paper-and-pencil test dealing with this objective as Table 32 shows. On the 52-item test one of these items was included, and both were included in the 69-item test.

Common objectives Based on the findings presented in this section, a set of objectives common to the five participating universities can be stated. These objectives are:

1. To comprehend and apply principles involved in taking body measurements
2. To comprehend and apply principles involved in selecting correct yardage
3. To comprehend and apply principles involved in interpreting a pattern
4. To apply principles involved in preparation of fabric before cutting
5. To comprehend and apply principles involved in placing pattern pieces on fabric
6. To comprehend and apply principles involved in pinning the pattern to the fabric
7. To comprehend and apply principles involved in cutting out garment pieces
8. To comprehend and apply principles involved in marking garment pieces
9. To comprehend and apply principles involved in using the sewing machine
10. To comprehend and apply principles involved in constructing darts
11. To comprehend and apply principles involved in using trimming and clipping techniques
12. To comprehend and apply principles involved in inserting sleeves
13. To comprehend and apply principles involved in applying slide fasteners
14. To comprehend principles involved in constructing hems.

Earlier in this section it was reported that the instructors in all five universities considered student satisfaction and enjoyment of sewing as an important objective. In response to an item on the course evaluation questionnaire, a copy of which is included in Appendix H, the students in all universities indicated they were strongly certain that they enjoyed sewing very much. Therefore, the following objective can be added to the list for the five universities.
15. To experience enjoyment and satisfaction in clothing construction.

When University B is not included, the following objectives can be added to the above:

16. To comprehend and apply principles involved in checking pattern type and size

17. To comprehend and apply principles involved in using stay-stitching

18. To comprehend and apply principles involved in constructing seams

19. To comprehend and apply principles involved in applying collars.

To indicate the importance attached to enjoyment as a motive for continuing to construct garments, the students responded to an item on the course evaluation questionnaire which asked them to rate four motives for continuing to construct garments. These motives were:

1. enjoyment
2. individual fashion
3. economy
4. to earn money.

The responses to this item are summarized in Table 33. It will be noted that the majority of students in Universities A, D, and E rated enjoyment as the most important motive for continuing to construct garments. The majority of students in Universities B and C judged that fashion was the most important motive. The motive of earning money by sewing was rated fourth by the majority of students in all universities.
Table 33

Distribution of Students by University According to Ratings of Motives for Continuing to Construct Garments

<table>
<thead>
<tr>
<th>Motives</th>
<th>Rating of motives</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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<tr>
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<td>16</td>
<td>17</td>
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</table>

Of the objectives that were common to the four universities, there were two for which there was no corresponding test item. These were pre-construction Objective 10, pinning the pattern to the fabric, and specific garment construction Objective 2, constructing darts. There were some items on the paper-and-pencil test pertaining to clothing construction processes that were not included in the lists of objectives on the course objectives questionnaire and course evaluation questionnaire. These items dealt with principles involved in using fabric bias and using staystitching.
Intercorrelations among Variables

Intercorrelations among predictors

Table 34 presents the intercorrelations among specific predictors based on the pooled within-university variance. Correlations between the predictors ranged from -.17 to .68. The highest correlation was between Predictor 6, percentage of her own clothing the student made in two years prior to enrollment in the elementary clothing course, and Predictor 7, the number of years a student made her own clothing.

Table 34
Intercorrelations among Predictors

<table>
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<tr>
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<td>-03</td>
<td>03</td>
<td>-09</td>
<td>29**</td>
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</table>

a1, cognitive ability in clothing construction as measured by the pretest; 2, number of years education in clothing construction at high school; 3, number of years education in clothing construction in a 4-H program; 4, learned clothing construction at home; 5, number of garments made in two years prior to enrollment in elementary clothing course; 6, percentage of her own garments a student made in two years prior to enrollment; 7, number of years a student made her own clothes; 8, previous experience making doll clothes; 9, number of years experience playing piano and organ; 10, typing speed in words per minute; 11, previous experience with knitting; 12, previous experience with crocheting.

*For 122 d.f., r±18 is significant at the 05 level.

**For 122 d.f., r±23 is significant at the 01 level.
There were positive correlations significant at or beyond the .01 level between Predictor 1, cognitive ability as measured by the pretest scores, and five other predictors. These predictors were: education in clothing construction in high school, the number of garments a student made in two years prior to enrollment in elementary clothing construction, the percentage of her own clothing a student made in two years prior to enrollment, the number of years a student made her own clothing, and previous experience making doll clothes. It appears that the more previous experience in clothing construction, the higher the cognitive level of ability tends to be.

Predictors 2, number of years of clothing construction education in high school, 3, learning clothing construction in a 4-H program, and 4, learning clothing construction at home, measured previous educational experience in clothing construction. There were positive correlations significant at the .01 level between Predictor 2, extent of clothing construction education in high school level, and two other predictors. These two predictors were cognitive ability as measured by the pretest and the number of years a student made her own clothing. This indicates that the more education in clothing construction at the high school level a student had, the greater the number of years she made her own clothing and the higher her cognitive ability in clothing construction tended to be; however, the correlations were low.

Correlations not significantly different from zero were found between Predictor 3, number of years of education in clothing construction in a 4-H program, and all other predictors except typing speed. This correlation was negative and significant at the .05 level. As indicated in
Table 5, only 14 students in the four universities had learned clothing construction in a 4-H program. As reported earlier, there was a significant difference at the .05 level among the universities on the mean number of years of clothing construction education in a 4-H program. Both of these findings could account for the low correlation between this predictor and other predictors.

Predictor 4, learning clothing construction at home, correlated significantly with only two other predictors. The correlations were significant beyond the .05 level with the percentage of her own clothing a student made in two years prior to enrollment in the elementary clothing course and beyond the .01 level with the number of years a student made her own clothing. This indicates that a student who learned clothing construction at home tended to make a large proportion of her own clothing and made her own clothing for a greater number of years.

Previous experience in clothing construction was measured by Predictors 5, 6, and 7. There were positive correlations significant beyond the .01 level between Predictor 5, number of garments made in two years prior to enrollment in the elementary clothing course, and four other predictors. These four predictors were cognitive ability as measured by the pretest, percentage of her own clothing a student made in two years prior to enrollment, the number of years a student made her own clothing, and previous experience making doll clothes. The greater the number of garments a student made in two years prior to enrollment, the higher her cognitive ability in clothing construction, the greater the number of years she made her own clothing, and the higher the proportion of her own clothing she made tended to be, and the more she tended to
have experience making doll clothes. There was no significant correlation between Predictor 5 and the amount of clothing construction education at the high school level.

Predictor 6, percentage of her own clothing a student made in two years prior to enrollment, correlated significantly beyond the .01 level with the pretest scores, the number of garments made in two years prior to enrollment, the number of years a student made her own clothing, and previous experience making doll clothes. Predictor 6 correlated significantly beyond the .05 level with learning clothing construction at home.

Predictor 7, the number of years a student made her own clothing, correlated significantly with six other predictors at or beyond the .01 level. These six predictors were learning clothing construction at home, cognitive ability as measured by the pretest, number of garments made in two years prior to enrollment in the clothing course, percentage of her own clothing a student made in two years prior to enrollment, extent of education in clothing construction at high school, and previous experience making doll clothes.

Predictors 5, 6, and 7, which measured previous experience in clothing construction, correlated significantly at or beyond the .01 level with each other, with cognitive ability in clothing construction as measured by pretest scores, and with previous experience making doll clothes. It appears that the more previous experience in clothing construction a student had as measured by Predictors 5, 6, and 7 and having experience making doll clothes, the greater her cognitive ability in this area tended to be.
Predictors 8, 9, 10, 11, and 12 measured finger dexterity background experience. Predictor 8, previous experience making doll clothes, correlated significantly at or beyond the .01 level with four other predictors. These predictors were cognitive ability as measured by the pretest, number of garments made in two years prior to enrollment in the course, percentage of her own garments a student made in two years prior to enrollment, and the number of years a student made her own garments. As reported in Table 41, Appendix J, the judges assigned low ratings for Predictor 8, and the mean normal deviate for this predictor was negative. It appears that the weight was lower than it should be because this predictor correlated positively with predictors to which the judges assigned more weight.

The correlation of Predictor 9, previous experience with playing piano and organ, with other predictors was not significantly different from zero. As reported previously, there was a significant difference at the .05 level between universities on the mean number of years of piano and organ experience. This could be one reason for the low correlation between this predictor and other predictors.

A negative correlation significant at the .05 level was found between Predictor 10, typing speed, and previous education in clothing construction in a 4-H program. Predictor 10 did not correlate significantly with any other predictor.

Predictor 11, previous experience with knitting, and Predictor 12, previous experience with crocheting, correlated significantly beyond the .01 level with each other only. It appears that a student who had previous experience with knitting tended to have previous experience with crocheting also.
None of the five predictors which measured finger dexterity background experience, except typing experience, correlated significantly with previous educational experience in clothing construction. Only one of these predictors, previous experience making doll clothes, correlated significantly with previous experience in clothing construction and with cognitive ability as measured by the pretest. It appears that this predictor was measuring behavior similar to experience in garment construction. The other four predictors measuring finger dexterity seemed to be measuring kinds of behavior which were different from those involved in clothing construction.

**Intercorrelations among criteria**

The results of the analysis of intercorrelations among the students' responses to the extent of difficulty experienced with comprehension and application of 32 course objectives showed that most of the correlations for 30 of the 32 objectives were significant beyond the .01 level. The two objectives dealing with buttonholes did not correlate significantly with other objectives on either behavioral aspect. Since responses to the 30 objectives were correlated, a single score was obtained for each student on this criterion measure by summing the student's responses to the extent of difficulty experienced with both behavioral aspects of the 30 objectives.

Intercorrelations among the five criteria based on the pooled within-university variance are shown in Table 35. The range of coefficients was from -.48 to .33; the highest positive correlation was between Criterion 2, extent of difficulty experienced with 30 course objectives, and Criterion
4, extent of learning of clothing construction. Data for Criterion 4 were obtained from a single response. Apparently the more difficulty the students judged they had with the course objectives the more they believed they learned, as expressed in their overall judgment.

Table 35
Intercorrelations among Criteria

<table>
<thead>
<tr>
<th>Criteria^a</th>
<th>1</th>
<th>2</th>
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</table>

\^a1, cognitive ability in clothing construction as measured by post-test; 2, extent of difficulty experienced with 30 course objectives; 3, extent to which clothing construction was judged as too easy; 4, judged extent of learning of clothing construction experienced during the course; 5, extent of enjoyment of sewing.

**For 122 d.f., \( r = \pm 23 \) is significant at the 01 level.

A negative correlation significant beyond the .01 level was found between Criterion 4, extent of learning of clothing construction the student judged she experienced during the course, and Criterion 3, extent to which the course was judged to be too easy. Data for Criterion 3 were obtained from a single response also. This correlation can be interpreted to mean that the less the course was judged to be too easy the more the students judged they learned. This latter finding is consistent with the former. There was no significant correlation between Criterion 4, overall judgment of extent of learning, and Criterion 5, extent of enjoyment of sewing. This finding was not expected because it was believed that
students who responded that they learned a great deal from the course would also respond that they enjoyed sewing.

Positive correlations significant beyond the .01 level were found between Criterion 1, cognitive ability in clothing construction, and Criterion 5, extent of enjoyment of sewing, as well as between Criterion 2, extent of difficulty experienced with specific objectives, and Criterion 4, the judged extent of learning achieved during the course. These findings appear to mean that the higher the score on the posttest the more the student enjoyed sewing, and the greater the difficulty experienced with course objectives the more she thought she learned about clothing construction.

There was a negative correlation significant beyond the .01 level between Criterion 1, cognitive ability as measured by the posttest, and Criterion 2, student judgment of extent of difficulty experienced with course objectives. This can be interpreted to mean that the higher the level of cognitive ability as measured by the posttest, the less difficulty with course objectives the student identified. A negative correlation significant beyond the .01 level was found also between Criterion 1, cognitive ability, and Criterion 4, judgment of extent of overall learning. This finding seems to be inconsistent with the finding regarding correlation between Criterion 2 and Criterion 4. However, Criterion 1 is not a measure of how much was learned during the course but a measure of cognitive ability in relation to clothing construction at the end of the course. It is possible that those who scored highest on the posttest did not necessarily learn the most because of the level of cognitive ability in this area when they began the course.
A negative correlation significant beyond the .01 level was found between Criterion 2, extent of difficulty experienced with course objectives, Criterion 3, extent to which students judged the course to be too easy, and Criterion 5, enjoyment of sewing. These correlations can be interpreted to mean that the more difficulty the students judged they had with each of the 30 course objectives, the less they judged the course as too easy and the less the students judged they enjoyed sewing. As reported previously, enjoyment of sewing is one of the objectives of the course that is common to the five universities. It would seem that the level of difficulty of the cognitive objectives needs to be examined. Cognitive objectives should be so planned that they are sufficiently difficult to stimulate learning but not so difficult as to inhibit enjoyment. Placement tests could be used by instructors in planning cognitive objectives in order to achieve this goal.

**Intercorrelations among predictors and criteria**

Table 36 shows the correlation of each of the 12 individual predictors with each of the five individual criteria used in this research for four universities. The correlation coefficients ranged from -.44 to .72. The number and magnitude of the correlations between predictors and criteria were used as a measure of the effectiveness of the predictors.

Predictors 1, 5, 6, and 7 correlated significantly beyond the .01 level with all criteria. This means that these predictors were effective in predicting the criteria used in this study.

Predictor 1, cognitive ability in clothing construction at the beginning of the course, correlated positively, with significance beyond
Table 36

Intercorrelations among Predictors and Criteria

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</table>

^1, cognitive ability in clothing construction as measured by pre-test; 2, number of years of education in clothing construction in high school; 3, number of years education in clothing construction in a 4-H program; 4, learning clothing construction at home; 5, number of garments made in two years prior to enrollment in elementary clothing construction; 6, percentage of her own garments a student made in two years prior to enrollment; 7, number of years a student made her own garments; 8, previous experience making doll clothes; 9, number of years experience playing piano and organ; 10, typing speed in words per minute; 11, previous experience with knitting; 12, previous experience with crocheting.

^2, cognitive ability in clothing construction as measured by post-test; 2, extent of difficulty experienced with 30 course objectives; 3, extent to which clothing construction was judged as too easy; 4, judged extent of learning of clothing construction experienced during the course; 5, extent of enjoyment of sewing.

*For 122 d.f., r=± 18 is significant at the .05 level.

**For 122 d.f., r=± 23 is significant at the .01 level.

the .01 level, with Criterion 1, cognitive ability in clothing construction at the end of the course. The highest correlation, .72, was found between these two variables. This indicates that the higher the level of cognitive ability in clothing construction at the beginning of the course the higher
the level of this ability tends to be at the completion of the course.

There were positive correlations significant beyond the .01 level between Predictor 1 and Criterion 3, extent to which the course was judged as too easy, and Criterion 5, enjoyment of sewing. This means that the higher the level of cognitive ability at the beginning of the course, the more the student judged the course as too easy and the more the student judged she enjoyed sewing. Negative correlations significant beyond the .01 level were found between Predictor 1, cognitive ability in clothing construction as measured by the pretest, and Criterion 2, extent of difficulty experienced with course objectives, and Criterion 4, extent of learning of clothing construction students judged they experienced during the course. This indicates that the higher the score on the pretest, the lower the level of difficulty experienced with objectives tended to be and the less the students judged they learned. It appears that, for those with high scores on the pretest, adjustments of the course objectives and learning experiences should be utilized in order to increase the difficulty and stimulate learning.

Predictor 5, number of garments made in two years prior to enrollment in the clothing course, Predictor 6, percentage of her own garments a student made in two years prior to enrollment, and Predictor 7, number of years a student made her own clothing, were categorized as previous experience in clothing construction. Positive correlations significant beyond the .01 level were found between each of these predictors and Criterion 1, cognitive ability in clothing construction as measured by the posttest, Criterion 3, extent to which a student judged the course as too easy, and Criterion 5, extent of enjoyment of sewing. These findings
indicate that the greater the extent of experience in clothing construction as measured by Predictors 5, 6, and 7, the higher the level of cognitive ability in clothing construction as measured by the posttest, the more the student tended to judge the course as too easy, and the greater the extent of enjoyment of sewing she judged she experienced. Negative correlations significant beyond the .01 level were found between each of these predictors and Criterion 2, extent of difficulty experienced with course objectives, and Criterion 4, judged extent of learning of clothing construction in the course. This finding indicates that the greater the extent of previous experience in clothing construction a student had, as measured by Predictors 5, 6, and 7, the less she judged she learned in the course and the less she judged she experienced difficulty with course objectives.

The finding that previous experience in clothing construction correlated negatively and significantly with extent of difficulty experienced with course objectives is consistent with the students' judgments regarding reasons for difficulty experienced with aspects of the course. As reported earlier, the majority of students in all universities judged that difficulty experienced with objectives of the course was related to previous experience.

The findings regarding Predictors 5, 6, and 7 measuring previous experience in clothing construction indicate that as a group they were effective predictors of cognitive ability in clothing construction as measured by the posttest, judgment of easiness of the course, and extent of enjoyment of sewing. They were effective in predicting, negatively, the extent of difficulty with course objectives and students' judgment of extent of learning of clothing construction in the course. The implication
of these findings is that for students who have a large amount of previous experience in clothing construction, as measured by these three predictors, some adjustments should be made in the course objectives and learning experiences in order to increase the difficulty of the course and to stimulate learning.

Predictors 8, 9, 10, 11, and 12 were categorized as finger dexterity experience. Predictor 8, previous experience making doll clothes, correlated positively and significantly at or beyond the .01 level with Criterion 1, cognitive ability in clothing construction as measured by the posttest, and with Criterion 3, extent to which the course was judged as too easy, and beyond the .05 level with Criterion 5, judgment of extent of enjoyment of sewing. This indicates that if a student had previous experience making doll clothes, the level of her cognitive ability at the end of the course tended to be high, the more the course was judged as too easy, and more she enjoyed sewing. Negative correlations significant beyond the .05 level were found between Predictor 8 and Criterion 4, judgment of extent of learning of clothing construction experienced during the course, and at the .01 level between this predictor and Criterion 2, extent of difficulty experienced with course objectives. This shows that students who had previous experience making doll clothes tended to judge they learned less from the course and experienced less difficulty with course objectives than those without such experience. The correlations between Predictor 8 and Criteria 4 and 5 were low, however.

Predictor 9, experience with playing piano and organ, correlated significantly beyond the .05 level with only Criterion 3, extent to which the course was judged too easy. This negative correlation was too low to
be meaningful. Predictor 10, typing experience, correlated at the .05 level of significance with only Criterion 5, extent of enjoyment of sewing. This correlation, also, was too low to be meaningful. No significant correlations were found between Predictors 11 and 12 and any of the criteria.

These findings show that of the five finger-dexterity-experience predictors, only previous experience making doll clothes was effective in predicting the criteria used in this research. Predictors 9, 10, 11, and 12 did not appear to be functioning effectively.

Predictors 2, 3, and 4 measured previous educational experience in clothing construction. Predictor 2, the number of years of education in clothing construction in high school, was not effective for predicting cognitive ability, the extent to which the course was judged as too easy, or the extent of enjoyment of sewing. This finding was not expected because it was believed that the more education in clothing construction a student experienced at the high school level, the greater her cognitive ability in this area would be, the easier she would judge the course to be, and the more she would judge she enjoyed sewing. Negative correlations significant beyond the .01 level were found between this predictor and Criterion 2, extent of difficulty experienced with course objectives, and Criterion 4, judged extent of overall learning. These negative correlations indicate that the more education in clothing construction experienced by the student in the high school, the less difficulty with course objectives and the less learning in the course the student tended to report. This implies that for students who had the greatest number of years of education in clothing construction in the high school, the
objectives and learning experiences of the course should be adjusted to increase the difficulty and to stimulate learning.

There appears to be inconsistency between the findings regarding Predictor 2, previous education in clothing construction in high school, and the two criteria measuring difficulty with the course. No significant correlation was found between this predictor and Criterion 3, the extent to which the course was judged to be too easy, but it was found that the more education in clothing construction in high school a student had, the less difficulty she judged she experienced with course objectives. Greater reliance can be placed on the latter finding because data for Criterion 2, extent of difficulty experienced with course objectives, were obtained from many responses, while data for Criterion 3 were obtained from a single response.

No significant correlations were found between Predictor 3, number of years education in clothing construction in a 4-H program, and any of the criteria. This means that the number of years a student learned clothing construction in a 4-H program was not effective as a predictor of the criteria used in this research. The fact that there were only 14 students who had learned clothing construction in a 4-H program could be one reason this predictor was not functioning effectively. As reported earlier, low correlations were found between this predictor and most of the other predictors.

A positive correlation significant above the .05 level was found between Predictor 4, learning clothing construction at home, and Criterion 1, cognitive ability in clothing construction at the completion of the course. This indicates that if a student learned clothing construction at
home, she tended to have a high level of cognitive ability in clothing construction at the end of the course. The correlation is too low to be meaningful, however. As reported in Table 34, learning clothing construction at home did not correlate significantly with cognitive ability at the beginning of the course. A negative correlation significant at the .05 level was found between Predictor 4 and Criterion 4, the judged extent of overall learning of clothing construction; however, the correlation was too low to be meaningful.

As a group the predictors which measured previous educational experience in clothing construction were not very effective. Only Predictor 2 correlated at the .01 significance level with any of the criteria.

Of the 12 predictors used in this research, four were found to have significant correlation beyond the .01 level with all criteria. These were Predictors 1, cognitive ability in clothing construction; 5, number of garments made in two years prior to enrollment in elementary clothing construction; 6, percentage of her own garments a student made in two years prior to enrollment; and 7, number of years a student made her own garments. These predictors were the most effective ones. Predictor 8, previous experience making doll clothes, was considered an effective predictor because it correlated significantly at least above the .05 level with each of the criteria. Predictor 2, number of years of education in clothing construction in high school, was less effective as a predictor but was functioning with two criteria. The predictive validity of these six predictors was thus established.

Predictor 3, number of years of education in clothing construction in a 4-H program, was not effective, probably because of the small number of...
students who responded to this predictor. It is possible that if more students had experience with clothing construction in a 4-H program, this predictor would have correlated significantly with some or all criteria. Predictors 4, 9, and 10 were considered ineffective because each correlated with only one or two criteria with significance above the .05 level. Predictors 11 and 12 were not functioning as predictors because they did not correlate significantly with any criteria. It was concluded that these six predictors did not have predictive validity for the criteria used in this research.

**Correlations between composite predictor and composite criterion scores**

A composite predictor score was calculated for each student in the four universities using weighted individual predictors, including assigning zero weights to predictors with negative mean normal deviates. As Table 41 in Appendix J reports, negative mean normal deviates were obtained for five predictors. The predictors which were included in the composite scores because positive weights were assigned were: 1, cognitive ability in clothing construction as measured by the pretest; 2, number of years of education in clothing construction at high school; 3, number of years of education in clothing construction in a 4-H program; 4, learning clothing construction at home; 5, number of garments made in two years prior to enrollment in the clothing course; 6, percentage of her own clothing a student made in two years prior to enrollment; and 7, number of years a student made her own clothing. Predictors with negative mean normal deviates and, hence, not included in the composite scores were: 8, previous experience making doll clothes; 9, number of years experience
playing piano and organ; 10, typing experience in words per minute; 11, previous experience with knitting; and 12, previous experience with crocheting.

Composite criterion scores were calculated in a manner similar to that used for calculating composite predictor scores. Table 42 in Appendix J reports that a negative mean normal deviate was obtained for one of the criteria. The criteria with positive mean normal deviates and included in the composite scores were: 1, cognitive ability in clothing construction as measured by the posttest; 2, extent of difficulty experienced with 30 course objectives; 4, judged extent of learning of clothing construction in the course; and 5, extent of enjoyment of sewing. Criterion 3, extent to which students judged clothing construction as too easy, was not included because the mean normal deviate was a negative value. Criterion 6 was not included in the composite scores for the four universities because it was found that scoring on sample garments was not consistent among the universities. It was concluded that scores assigned garments constructed by students would be unreliable among the universities also.

Correlations between the two composite scores were calculated in order to determine whether, as a group, the predictors had predictive validity in relation to the group of criteria used. Correlations between the composite scores yielded a coefficient of .12 which was not significantly different from zero. The tabular correlation coefficient for 122 degrees of freedom at the .01 significance level is .23. The composite predictor, consisting of weighted scores for the seven predictors, did not predict the composite criterion score consisting of weighted scores
for Criteria 1, 2, 3, and 5. The composite predictor score did not have predictive validity in relation to the composite criterion score.

The results of the correlation between composite predictor scores and composite criterion scores indicate that different weights should have been used for predictors, and criterion measures. Because individual predictors correlated significantly with each other and with specific criteria, a significant correlation should have been found between the two sets of composite scores if appropriate weights had been applied. In the discussion which follows, weights are suggested for each effective predictor on the basis of the effectiveness of each in relation to the criteria and in relation to the number and magnitude of significant correlations with other predictors. Weights are also suggested for each of the criteria on the same basis.

It was found that Predictor 1, cognitive ability in clothing construction as measured by the pretest, was effective as a predictor of the five criteria used in this research for the four universities. Correlations of this predictor with all five criteria were significant beyond the .01 level. This predictor correlated also with significance beyond the .01 level with other predictors which were found to be effective. The mean normal deviate obtained for this predictor was 109.6, the highest of all mean normal deviates for all variables. This was an indication that the judges considered that this was the most important predictor of performance of college elementary clothing construction. It is recommended that this predictor be retained in subsequent research and that the weight used in this research be applied to it.
Predictors 5, number of garments made in two years prior to enrollment in the course, 6, percentage of her own garments a student made in two years prior to enrollment, and 7, number of years a student made her own garments, were found to be effective as predictors. These predictors correlated significantly above the .01 level with all criteria, with each other, with Predictor 1, and with some other predictors. In addition to correlating with Predictors 5 and 6, Predictor 7 correlated with four other predictors with significance beyond the .01 level. The weights assigned the three predictors were 4.2 for Predictor 7, 49.6 for Predictor 5, and 56.0 for Predictor 6. Except for their lower correlations with Criterion 1, each of these predictors was as effective as Predictor 1 which was given a weight of 109.6. It is recommended that these predictors be retained in future research and that the weights given them be higher, similar in value to the weight given to Predictor 1.

Of the five predictors, 8, 9, 10, 11, and 12, categorized as finger dexterity background experience, only Predictor 8, previous experience making doll clothes, was found to be effective in predicting criteria used in this research. This predictor was found to correlate with three criteria beyond the .01 significance level and with two criteria beyond the .05 significance level. Correlations significant beyond the .01 level were found with four other predictors which were also found to be effective. A negative weight was given this predictor; hence, it was not included in the composite predictor scores. It appears that the weight for this predictor should have been positive. Data for Predictor 8 were obtained from a single question which called for a yes or no response. The weight assigned to it should be positive but, because it was based on
a single yes or no response, the weight should be lower than for those predictors for which data represented a sum of responses or behaviors.

Predictors 9, 10, 11, and 12 were found to be ineffective to predict criteria used in this research. Negative weights were assigned these predictors; therefore, they were not used in the calculation of the composite scores. The weights seemed to be appropriate for this research. It is recommended that these predictors not be included in future research if the criteria used in this research are used.

Of the predictors which measured previous educational experience, only two were found to have some effectiveness in predicting the criteria used. Predictor 3, number of years education in clothing construction in a 4-H program, was found to be ineffective because no significant correlation was found between this predictor and any of the criteria. Predictor 3 was assigned a positive weight of 41.2. As noted earlier only 14 of the 130 students in the four universities indicated they learned clothing construction in a 4-H program. For this research the predictor should not have been included in the composite scores. In future research it is recommended that this predictor not be used if the proportion of students who learned clothing construction in a 4-H program is small.

Predictor 2, number of years of education in clothing construction in high school, was found to be partially effective in predicting criteria used in this research. This predictor correlated significantly at or beyond the .01 level with only Criteria 2 and 4 and with only two other predictors. Data for Criterion 4 were obtained from a single judgment of students regarding extent of learning experienced in the course. This criterion was considered to be weak and the significant correlation found
between it and Predictor 2 was considered less important than that found between Predictor 2 and Criterion 2. Because no significant correlation was found between this predictor and Criterion 1, which appeared to be a strong criterion, the effectiveness of this predictor was considered to be limited. The judges rated Predictor 2 as next in importance to Predictor 1, with the mean normal deviate being 67.8. It appears that the weight assigned Predictor 2 was higher than it should be considering that it was not highly effective. It is recommended that this predictor be tested further. If its effectiveness in future research is similar to that found in this research, a lower weight should be assigned to it.

Predictor 4, learning clothing construction at home, was not effective in predicting criteria used in this research. This predictor correlated with only Criteria 1 and 4 with significance at or beyond the .05 level, but the correlations were too low to be meaningful. The data for this predictor were obtained from a question which called for a yes or no response. The weight assigned this predictor was low, the mean normal deviate being 3.0. This was probably an appropriate weight considering the lack of effectiveness of this predictor. Because it is functioning, at least partially, it is recommended that it be retained for further study and that a low positive weight be assigned to it.

All five criteria used in this research correlated significantly beyond the .01 level with at least four of the predictors. Criterion 1, cognitive ability in clothing construction as measured by the posttest, correlated significantly at or beyond the .01 level with five predictors and three other criteria and beyond the .05 level with one predictor. This criterion was included in the composite scores with a weight of
95.0. The mean normal deviate was lower than that obtained for Predictor 1 (109.6) which used the same test. The judges apparently considered the test less important as a measure of performance than as a predictor of performance. Because the correlation of this criterion with Predictor 1 was the highest of all correlations \((r=0.72)\), it appears that Criterion 1 should be assigned a higher weight, possibly a weight equal to that assigned Predictor 1.

Criterion 2, extent of difficulty experienced with 30 course objectives, correlated significantly at or beyond the .01 level with six predictors and with all other criteria. These correlations, except that with Criterion 4, were negative and indicate that the greater the level of cognitive ability, the extent of previous education and previous experience in clothing construction and making doll clothes, the less difficulty a student judged she had with the course. It appears that this is a strong criterion and should be retained in further research. However, it should be given a higher weight in the composite criterion scores. The weight assigned to it was 42.7. From the standpoint of its effectiveness in terms of its correlation with predictors and other criteria, it should receive comparable weight to Criterion 1. Its relative importance among the criteria in terms of relationship to achievement of course objectives is a matter of judgment.

Data for Criterion 3, extent to which the course was judged as too easy, were obtained from a single judgment of the students. This criterion correlated significantly beyond the .01 level with five predictors and two other criteria and beyond the .05 level with one predictor. Although less effective than Criteria 1 and 2 in number and magnitude of
correlations, Criterion 3 appeared to be effective. The data for Criterion 3, obtained from a single response item, measured the same kind of information as Criterion 2 did in 60 responses (responses to extent of difficulty experienced with both comprehension and application of 30 course objectives). Because of this it need not be used in further research. This criterion was not included in the composite scores because the judges rated its importance as low, the mean normal deviate being a negative value. If it is included in further research, it is recommended that the weight assigned it be positive but lower than that for Criterion 2 because it was somewhat less effective and because the data were obtained from a single judgment response. A rating of 70 on the 99-point rating scale, interpreted as moderately important, is suggested as appropriate for this criterion. The corresponding normal deviate is 52.

Criterion 4, judgment of extent of learning of clothing construction experienced during the course, was based on a single response using a 9-point rating scale. Because it was based on a single response, it is not considered as strong a criterion as others for which scores were obtained from many responses. However, this criterion correlated significantly beyond the .01 level with five predictors and three other criteria and significantly beyond the .05 level with two predictors. The fact that all of the significant correlations with predictors were negative indicates that the higher the score was on these predictors, the lower the score was on this criterion. Specifically, the higher the level of cognitive ability exhibited on the pretest, the greater the extent of previous education and experience in clothing construction, and experience
making doll clothes, the less the student judged she learned. If the course had been adjusted to provide students who had high levels of cognitive ability and previous education and experience in clothing construction with more new learning experiences, it is expected they would have responded they learned more from the course. Criterion 4 was included in the composite scores with a weight of 97.5. Although it was effective, it was not as effective as Criteria 1 and 2; therefore, the weight should not be as high as that for Criteria 1 and 2. It is recommended that Criterion 4 be retained and a weight of 67, corresponding to a rating of 75 on the 99-point rating scale, be assigned to it.

Criterion 5, extent of enjoyment of clothing construction, correlated significantly at or beyond the .01 level with four predictors and two other criteria and beyond the .05 level with two predictors. It appears that this criterion is effective. It was included in the composite scores with a weight of 74.5, a higher weight than that assigned to Criterion 2 which seemed to be functioning more effectively. Enjoyment of sewing was judged by the instructors as an important objective of the course. It is recommended that a more reliable and more extensive criterion measure of this objective be used and that the weight assigned to it be as high as that suggested for Criteria 1 and 2.

Criterion 6, practical performance in clothing construction as measured by garment scores, was not used in the correlation analysis for the four universities because it was believed the scores would be unreliable. This judgment was based on the finding that sample garment scores were inconsistent from university to university. It is the opinion of this researcher that practical construction ability is an important
outcome of a college elementary clothing construction course and that efforts should be made to obtain reliable scores for and effective predictors of practical construction ability. Research findings as reported in the Review of Literature were not in agreement regarding effective predictors of clothing construction performance. Some researchers (Saddler, 1945; Evans, 1947; Scholtes, 1948; Patson, 1952; Semeniuk, 1961; Shaw, 1971) found that scores on a paper-and-pencil test were effective predictors. Vermilyea (1967) found a low correlation between test scores and garment scores. Witt (1961) found that competence in the cognitive area did not predict practical ability. Scholtes (1948) and Patson (1952) found that finger dexterity background experiences were effective in predicting garment scores. It is possible that the finger dexterity background experiences used in this research would have correlated significantly with garment scores if garment scores had been reliable. In future research it is recommended that efforts be made to establish reliability in scoring of garments among universities and that garment scores be used as criterion measures of practical ability. Reliability of scoring could be achieved by training the instructors in scoring techniques. If reliable garment scores are used as criterion measures, it is recommended that finger dexterity background experiences be tested as predictors.

The weight assigned garment scores in this research was 76.7. If a reliable measure of practical ability in clothing construction was obtained and effective predictors of this criterion measure were found, the weight assigned such a criterion should be similar to that given to cognitive ability and extent of difficulty experienced with course objectives.
Intercorrelations among variables for each university

Intercorrelations among variables were computed for each of the five universities using clothing construction ability as measured by garment scores for a sixth criterion. Correlations among specific predictors and specific criteria were obtained as well as correlations between weighted composite scores for each university.

It was found that Predictor 1, cognitive ability in clothing construction as measured by the pretest, correlated significantly beyond the .01 level with Criterion 1, cognitive ability in clothing construction as measured by the posttest, in all universities except University B. Correlations significant beyond the .01 level were found between Predictor 1 and 1) four other predictors and five criteria in University A, 2) one predictor and one criterion in University C, 3) one predictor and one criterion in University D, and 4) one criterion in University E. Correlations significant beyond the .05 level were found between Predictor 1 and 1) one other predictor in University A, 2) two predictors and one criterion in University C, 3) three predictors and one criterion in University D. The findings for University A on this predictor were similar to those found in the correlation analysis for the four universities. This was probably because the number of students in University A (n=47) was larger than in other universities.

Predictors 2, 3, and 4 measured previous education in clothing construction. No significant correlations were found for Predictor 2, extent of education in clothing construction at high school, in Universities B, C, and D. Only two correlations significant beyond the .01 level were found between this predictor and other variables. In University A
Predictor 2 correlated with one predictor and one criterion with significance beyond the .01 level. Correlations significant beyond the .05 level were found between Predictor 2 and two other predictors and two criteria in University A and one predictor in University E.

Predictor 3, extent of education in clothing construction in a 4-H program, correlated significantly at or beyond the .05 level with 1) Criterion 6, practical ability in clothing construction as measured by garment scores, in University D and 2) Predictors 7, number of years a student made her own clothing, and 10, previous experience with typing, and Criterion 2, extent of difficulty experienced with 30 course objectives, in University E. While the number and magnitude of these correlations are small, the findings regarding Predictor 3 indicate that education in clothing construction in a 4-H program was functioning in University E. This was probably because in this university a large proportion of students (7 of 21) responded that they learned clothing construction in a 4-H program.

Correlations significant beyond the .05 level were found between Predictor 4 and 1) one criterion in University A, 2) one predictor and one criterion in University C, and 3) one predictor in Universities D and E.

As a group, the predictors measuring previous education in clothing construction were not highly effective. The findings showed that in University A Predictor 2 was more effective than it was in the other universities. The number and magnitude of correlations of this predictor in University A resemble the results of the pooled within-university correlations.

The three predictors which measured previous experience in clothing
construction correlated with each other in Universities A, C, and D with significance beyond the .01 level. This finding was similar to the results of the pooled within-university correlation analysis. Significant correlations beyond the .01 level were found between these predictors and at least four criteria in University A. In Universities C and D these predictors correlated with some but not all criteria. There were fewer significant correlations among variables in Universities B and E than in the other three universities.

Of the five predictors measuring finger dexterity experience, previous experience making doll clothes correlated significantly beyond the .01 level with three predictors and five criteria in University A and beyond the .05 level with 1) one predictor in Universities A, B, and D, and 2) three predictors and two criteria in University C. The other four predictors in this category correlated significantly with few other variables.

Significant correlations beyond the .01 level were found between Criterion 1, cognitive ability in clothing construction as measured by the posttest, and 1) four predictors and four criteria in University A, and 2) one predictor in Universities C, D, and E. Correlations significant beyond the .05 level were found between Criterion 1 and 1) two predictors and one criterion in Universities A and B, 2) three predictors in University D, and 3) one predictor and one criterion in University D.

Correlations significant beyond the .01 level were found between Criterion 2, extent of difficulty experienced with 30 course objectives, and 1) six predictors and three criteria in University A, 2) one criterion in University C, and 3) three predictors in University D.
Correlations significant beyond the .05 level were found between Criterion 2 and 1) one predictor in Universities B and E, 2) four predictors and one criterion in University C, and 3) two criteria in University D.

Criterion 3, extent to which the course was judged as too easy, correlated significantly beyond the .01 level with four predictors and two criteria in University A. Correlations significant beyond the .05 level were found between Criterion 3 and 1) two predictors and one criterion in Universities A, C, and D, 2) one criterion in University B, and 3) two predictors in University E.

Criterion 4, extent of learning experienced in the course, correlated with significance beyond the .01 level with five predictors and three criteria in University A and with one criterion in University E. Correlations significant beyond the .05 level were found between Criterion 4 and 1) one criterion in Universities B and E, and 2) three predictors and one criterion in Universities C and D.

Criterion 5, extent of enjoyment of sewing, correlated significantly beyond the .01 level with 1) four predictors and one criterion in University A, 2) two criteria in University C, and 3) one criterion in University E. Correlations significant at or beyond the .05 level were found between Criterion 5 and one criterion in Universities A, B, D, and E, and one predictor in University C.

Results of the correlation analysis for each university show that in only one of the five universities did Criterion 6, practical ability in clothing construction as measured by garment scores, correlate with significance beyond the .01 level with any of the predictors. In University A Criterion 6 correlated significantly beyond the .01 level with
Predictor 1, cognitive ability as measured by the pretest \((r=.43)\), and Predictor 5, number of garments a student made in two years prior to enrollment \((r=.40; \, r_{.01}=.37 \text{ for } 45 \text{ d.f.})\). In University D a correlation significant beyond the .05 level was found between Predictor 6 and Predictor 3, previous education in clothing construction in a 4-H program \((r=.47; \, r_{.05}=.40 \text{ for } 22 \text{ d.f.})\).

Criterion 6 was found to correlate significantly at least beyond the .05 level with some of the criteria. In University A a positive correlation significant beyond the .01 level was found between Criterion 6 and Criterion 1, cognitive ability as measured by posttest scores \((r=.42; \, r_{.01}=.37 \text{ for } 45 \text{ d.f.})\), and a positive correlation significant beyond the .05 level was found between garment scores and Criterion 5, extent of enjoyment of sewing \((r=.35; \, r_{.05}=.29 \text{ for } 45 \text{ d.f.})\). In University B a positive correlation significant at the .01 level was found between Criterion 6 and posttest scores \((r=.49; \, r_{.01}=.49 \text{ for } 25 \text{ d.f.})\), and a positive correlation significant beyond the .05 level was found between Criterion 6 and Criterion 5, extent of enjoyment of sewing \((r=.46; \, r_{.05}=.38 \text{ for } 25 \text{ d.f.})\). In University C there was a negative correlation \((r=-.40)\) significant beyond the .05 level between Criterion 6 and Criterion 2, extent of difficulty experienced with 30 course objectives, as well as a positive correlation significant beyond the .05 level between Criterion 6 and Criterion 5, extent of enjoyment of sewing \((r=.46; \, r_{.05}=.32 \text{ for } 36 \text{ d.f.})\). Criterion 6 correlated with no other criterion in University D. In University E there was a positive correlation between Criterion 6 and Criterion 4, extent of learning experienced during the course \((r=.53)\),
and Criterion 5, extent of enjoyment of sewing ($r = .47$), beyond the .05 level of significance ($r_{.05} = .43$ for 19 d.f.).

The findings regarding Criterion 6 indicate that practical ability in clothing construction measured by garment scores was not effective as a criterion. This variable correlated significantly with only two predictors in University A and with only one predictor in University D. It is possible that the unreliability among universities on sample garment scores may be reflected in the scores for students' garments within universities. As mentioned earlier, it is believed that practical ability in clothing construction is an important outcome of the course. If reliability in garment scores can be achieved, these scores should be used in further research.

The results of the correlation analysis for each university show that the correlations which were found to be significant for University A most closely resemble those found from the analysis of the four universities combined. This was probably because the number of students in University A ($n = 47$) was larger than in any other university. Few significant correlations were found among the variables in University B.

Results of the correlations of the composite weighted predictor scores with the composite weighted criterion scores showed that in only University C was the correlation significant beyond the .05 level. A coefficient of .35 was obtained ($r_{.05} = .32$ for 36 d.f.).

In all of the analyses computed for each university, data from small numbers of students were used. Although comments are made on some of the findings, no definite conclusions can be drawn from the results.
SUMMARY AND RECOMMENDATIONS

Summary

The present research was conducted in the five universities located in the Maritime Region of Canada which offered degree programs in home economics. There was some indication that the instructors of clothing construction in these universities were aware that there were differences in levels of cognitive ability and extent of previous experience related to clothing construction among students who enrolled in the elementary clothing course. It was believed that more learning would occur if the extent of cognitive ability and previous experience in clothing construction of the students were identified and curricular adjustments for individual differences were made in elementary clothing construction in these universities.

The Maritime Provinces of Canada, New Brunswick, Nova Scotia, and Prince Edward Island, constitute a distinct geographic region with similar economic, social, and educational needs. Cooperation and coordination of educational activities within this region have been considered desirable, feasible, and necessary by the Provincial Governments and the universities located there. For this reason, it seemed desirable to conduct this research in the universities, which offered home economics degree programs, in the region.

The purposes of this research were as follows: to describe the clothing construction segment of beginning clothing courses at all universities located in the Maritime Provinces of Canada where degree programs in home economics are offered; to adapt and to test the predictive
validity of predictive measures for use in the placement of students in beginning clothing construction; and to recommend adjustments for individual differences among students in beginning clothing construction in universities in the Maritime Provinces of Canada.

In conducting this research it was assumed that changes in cognitive behavior as measured by a posttest would be due to the learning experiences of the course. It was assumed also that coordination of basic courses in all disciplines in the universities of the Maritime Provinces will be expected by the Maritime Provinces Higher Education Commission, that the quality of instruction in clothing construction in the participating universities would be comparable, that the development of placement instruments would contribute to the improvement of instruction and would facilitate coordination of elementary clothing courses, and that adjustments for individual differences would be desirable and feasible.

The research was limited to the geographic region of the Maritime Provinces of Canada. The universities participating in the study were so situated as to make it costly in terms of time and money for the researcher to make personal contact with the instructors. The researcher's absence from Iowa State University while data were being collected limited the opportunities for consultation regarding procedure.

Participants in the research were 157 students who enrolled in the beginning clothing courses in the five universities during the 1972-1973 university year. There were 47 students in University A, 27 in University B, 38 in University C, 24 in University D, and 21 in University E. One instructor in each university was responsible for the elementary clothing course of which clothing construction was a segment.
Instruments were developed and adapted for the purpose of obtaining data on predictors and criteria. A 98-item objective test, adapted from the Iowa State University Textiles and Clothing Department Placement Test, was administered as a pretest and posttest. Scores on the pretest were measures of cognitive ability in clothing construction and were used as a predictive measure. The Iowa State University Textiles and Clothing Department background experience questionnaire and finger dexterity background questionnaire were combined and adapted to obtain information regarding extent of students' experiences related to clothing construction. Responses to the items on this questionnaire were used as predictors. There were three items which measured previous educational experience in clothing construction, three items which measured previous experience in clothing construction, and five items which measured finger dexterity experience.

Scores on the posttest were used as a criterion measure and were labeled as Criterion 1. A course evaluation questionnaire was developed to obtain data on the outcomes of the course. Specifically, information was obtained regarding 1) extent of difficulty experienced with comprehension and application of 32 course objectives, 2) extent to which the course was considered to be too easy, 3) extent of learning of clothing construction experienced during the course, and 4) extent of enjoyment of sewing. Students also rated motives for continuing to sew and gave opinions regarding reasons for difficulties experienced with aspects of the course.

Instruments for measuring garment scores were developed. These were used by the instructors to score three sample garments for the purpose of
determining if scoring was reliable from university to university. Scores were obtained on garments constructed by students using these instruments. It was intended, if the sample garment scores were reliable, that the garment scores would be used as criterion measures.

A course objective questionnaire was developed for the purpose of obtaining instructors' judgments regarding the emphasis placed on comprehension and application of 32 objectives believed to be appropriate for college elementary clothing construction courses. To obtain information regarding student enrollment in the course, the need for placement, and content validity of the objective test, an interview questionnaire was developed for the instructors.

An instrument for obtaining judges' ratings of importance of the predictors and criterion measures used in this research was developed. It was administered to five clothing construction instructors at Iowa State University.

Item analyses of the 69-item pre- and posttests were carried out. Analysis of variance was computed for responses to extent of difficulty experienced with comprehension and application of each of 32 course objectives and for all predictors and criteria for five universities and for four universities (excluding University B). Correlation analysis of each of the responses to the extent of difficulty experienced with comprehension and application of 32 course objectives was obtained to determine if one score could be used for this criterion measure. A factorial analysis of variance of the sample garment scores was computed to determine if these scores were consistent from university to university. Correlations of specific predictors and specific criteria for the four
universities, and correlation of composite weighted predictor and criterion scores were computed.

The content validity of the 98-item objective test was established on the basis of the judgment of the instructors that the test items were representative of the objectives of the course. In order to determine if the five universities were similar enough for data to be pooled for analysis, an item analysis of the 98-item posttest was obtained. The difficulty index of each test item for each of the five universities was plotted against the index of the item for the five universities combined. A study of the scattergrams showed that the indices of 52 items were found to be similar in the five universities. One university, labeled as University B, seemed to have a lower range of difficulty indices. When it was excluded from the comparison, 69 items were found to be common to the four remaining universities. It was concluded that because University B was different from the other universities in regard to the difficulty indices, data for students in this university would not be used in some of the analyses.

From the item analysis of the 69-item pretest for the four universities (n=130), a reliability coefficient of .70 was obtained. This was considered acceptable. The discriminating power of 52 items was found to be satisfactory, the difficulty indices of 47 items were within the acceptable range of difficulty (30 to 70), and all response options of 65 items were selected by at least two students. Results of analysis of variance showed that there was no difference among the four universities in levels of cognitive ability of students in the four universities as measured by the test scores.
On the three predictors which measured extent of previous education in clothing construction, differences were found among students within each of the five universities. Results of the analysis of variance of the predictors showed that there was no significant difference between the five universities on the extent of education in clothing construction at high school or on learning clothing construction at home. However, a difference significant at the .01 level was found on the extent of education in clothing construction in a 4-H program ($F=3.19; F_{0.01}=2.43$ for 4, 152 d.f.). From the analysis of variance using data for four universities (excluding University B), a significant difference at the .05 level was found ($F=3.40; F_{0.05}=2.68$ for 3, 126 d.f.). It was noted that a small number of students (16 of 157 in the five universities, 14 of 130 in four universities) indicated they learned clothing construction in a 4-H program.

It was found that there were differences among students within each university on the extent of experience in clothing construction as measured by Predictors 5, number of garments made in two years prior to enrollment in the elementary clothing course; 6, percentage of her own garments a student made in two years prior to enrollment; and 7, number of years a student made her own clothing. There was no significant difference between the five universities on Predictors 5 and 6. A difference significant at the .05 level was found between universities on Predictor 7 ($F=2.51; F_{0.05}=2.43$ for 4, 152 d.f.). From the analysis of variance using data for four universities, no significant difference was found on Predictor 7.
Differences were found among students within each university on the extent of finger dexterity experience. The results of the analysis of variance showed that there was no significant difference between the five universities on Predictors 8, experience making doll clothes; 10, experience with typing; and 12, experience with crocheting. Difference significant at the .05 level was found among the universities on Predictor 11, experience with knitting ($F_{0.05} = 2.43$ for 4, 152 d.f.); at the .01 level on Predictor 9, experience with playing piano and organ ($F_{0.01} = 3.44$ for 4, 152 d.f.); and at the .05 level between the four universities on the latter predictor ($F_{0.05} = 2.68$ for 3, 126 d.f.).

From the item analysis of the 69-item posttest for four universities, the scores of which were used as criterion measures, a reliability coefficient of .69 was obtained. The discriminating power of 43 items was found to be satisfactory, all response options of 46 items were chosen by two or more students ($n = 130$), and the difficulty index of 33 items was within the acceptable range (30 to 70). More than 70 percent of the students in the four universities responded correctly to 31 items. This was an increase of 11 items in this category over the 69-item pretest. It was concluded that the 69-item posttest was easier for students in the four universities than the pretest was. Analysis of variance results showed that there was no significant difference between universities on the scores for the 69-item posttest.

For the analysis of variance of extent of difficulty experienced with comprehension and application of 32 course objectives, all responses were used. The course objectives were categorized as preconstruction objectives (12), general clothing construction objectives (5), and specific
garment construction objectives (15). There were significant differences at least at the .05 level between the five universities on extent of difficulty experienced with application of principles involved in one course objective and with both comprehension and application of principles involved in five other objectives. Students' judgments of reasons for difficulties experienced with course objectives indicated that the majority judged that little or no previous experience accounted for difficulties encountered, and the majority of them judged that having previous experience was the reason for the experience of little or no difficulty.

Analysis of intercorrelations among responses to extent of difficulty experienced with course objectives showed that 30 of the 32 objectives correlated with each other on both behavioral aspects with significance at least at the .05 level. The two objectives which did not correlate significantly with others were specific garment construction objectives 9, making hand worked buttonholes, and 10, making bound buttonholes. On the basis of these results it was concluded that students' responses to the 30 objectives could be summed to give a single score. This score was used as a criterion measure. Analysis of variance on these scores showed that there was no significant difference between the five universities.

On Criteria 3 and 4, extent to which the course was judged as too easy and the judged extent of learning experienced during the course, significant differences at the .01 level were found between the five universities. Significant differences at the .05 level were found among the four universities on Criterion 3 and at the .01 level on Criterion 4.
No significant difference was found between universities on Criterion 5, extent of enjoyment of sewing. The university mean responses indicated that students in the five universities responded with moderate-to-strong certainty that they enjoyed sewing. The instructors in the five universities indicated that satisfaction and enjoyment of sewing was an important objective of the course. It appears that this objective was realized in all universities.

Results of the factorial analysis of variance on the sample garment scores showed that using three methods of treatment of scores, no consistency was found between universities. Because of the unreliability found in these scores, the scores on students' garments were judged to be unreliable and were not used as criterion measures for the four universities. They were used, however, for analysis of intercorrelation among variables for each university.

In order to describe elementary clothing construction offerings in the five universities, comparisons were made among courses. Responses to the course objectives questionnaire, course evaluation questionnaire, test items of the posttest; university catalog descriptions of courses; and information regarding enrollment in the course obtained from instructors of clothing construction were used. If the instructor responded that comprehension and application of a certain course objective were emphasized, the students responded that the objective was easy, and the test item dealing with the objective was found to have similar difficulty indices in all universities, the objective was judged to be common to the universities. Fifteen objectives were considered to be common to the five universities and 19 were found to be common to the four universities.
From the analysis of intercorrelations among predictors for four universities, it was found that there were five predictors which correlated with each other with significance at or beyond the .01 level. These were cognitive ability in clothing construction as measured by pretest scores, the three predictors which measured previous experience in clothing construction, and experience making doll clothes (one of the five predictors measuring finger dexterity experience). It appears that the more previous experience in clothing construction a student had, and having experience making doll clothes, the greater her cognitive ability in this area tended to be.

Predictor 2, number of years of education in clothing construction at high school, correlated significantly at the .01 level with Predictors 1 and 7, cognitive ability in clothing construction and number of years a student made her own clothing. It appears that the more education in clothing construction at high school, the higher the level of cognitive ability in this area and the greater the number of years a student made her own clothing.

From the analysis of intercorrelations among criteria, negative correlations significant beyond the .01 level were found between Criterion 1 and Criteria 2 and 4, Criterion 2 and Criteria 3 and 5, Criterion 3 and Criterion 4. These findings indicate that the higher the level of cognitive ability at the completion of the course, the less difficulty the student experienced with the course objectives and the lower the judged amount of learning; the more difficulty the student experienced with course objectives, the less the course was judged as too easy and the
less enjoyment the student judged she experienced; and the more the course was judged as too easy, the less the student judged she learned.

Positive correlations significant at or beyond the .01 level were found between Criteria 1 and 5 and between Criteria 2 and 4. These findings indicate that the higher the level of cognitive ability the more the student judged she enjoyed sewing, and the greater the difficulty experienced with course objectives the more she judged she learned. It would seem that the level of difficulty of cognitive objectives needs examination. Cognitive objectives should be so planned that they are sufficiently difficult to stimulate learning but not so difficult as to inhibit enjoyment. Placement tests could be used in planning cognitive objectives in order to achieve this goal.

No significant correlation was found between Criteria 4 and 5. This was unexpected because it was believed that students who responded they learned much from the course would also respond that they enjoyed sewing.

The effectiveness of predictors was determined by the number and magnitude of correlations with the criteria used in this research. Because the correlations of the following predictors with all criteria were significant beyond the .01 level, they were considered the most effective: Predictors 1, cognitive ability in clothing construction measured by the pretest; 5, number of garments a student made in two years prior to enrollment in the elementary clothing course; 6, percentage of her own clothing a student made in two years prior to enrollment; and 7, number of years a student made her own clothing. These findings indicate that if a student had a high level of cognitive ability at the beginning of the course and previous experience in clothing construction as measured by Predictors 5,
6, and 7, she tended to exhibit a high level of cognitive ability at the completion of the course, she judged she had little or no difficulty with course objectives, she responded that the course was too easy, she judged she did not learn a great deal in the course, and she reported she did not enjoy sewing very much. The implication of these findings is that adjustments should be made in the objectives and learning experiences of the course in order to increase the difficulty, stimulate learning, and contribute to enjoyment of sewing for those with previous experience and a high level of cognitive ability in clothing construction.

Predictor 8, previous experience making doll clothes, was an effective predictor, correlating significantly at or beyond the .01 level with three of the criteria and beyond the .05 level with two criteria. Predictor 2, number of years education in clothing construction at high school, was less effective than Predictors 1, 5, 6, 7, and 8. It correlated negatively and significantly beyond the .01 level with only Criteria 2, extent of difficulty experienced with 30 course objectives, and 4, judged extent of learning of clothing construction experienced during the course. This indicates that the more education in clothing construction a student had in high school, the less difficulty she judged she experienced in clothing construction and the less learning she tended to report. This implies that the objectives and learning experiences of the clothing construction segment of the elementary clothing course should be adjusted for students who have a large number of years education in clothing construction at high school in order to increase the difficulty level and to stimulate learning.
No significant correlation was found between Predictor 2 and Criteria 1, 3, and 5. This finding was not expected because it was believed that the more education a student had in clothing construction at high school, the higher the level of cognitive ability would be, the more the course would be judged as too easy, and the more enjoyment of sewing the student would judge she experienced.

Previous education in clothing construction in a 4-H program was not effective as a predictor in this research. No significant correlation was found between this predictor and any criterion. The fact that there was a small proportion of students who learned clothing construction in a 4-H program (14) was probably the reason that this predictor was ineffective. In future research, if a small proportion of students indicate they learned clothing construction in a 4-H program, this predictor should not be used. The finger dexterity experience predictors 9, 10, 11, and 12 were not effective with the criteria used.

Composite weighted predictor and criterion scores were calculated using as weights the mean normal deviates derived from the judges' ratings of variables. Variables with negative normal deviates were assigned zero weights. Correlation of composite weighted predictor scores and criterion scores was not significantly different from zero. It was judged that the weights were inappropriate for some of the variables because significant correlations were found among specific predictors and criteria. It was recommended that different weights be assigned some of the variables based on their effectiveness. It was suggested that the highest weights be assigned the most effective predictors, 1, 5, 6, 7,
and 8, and that the predictors which were found to be ineffective be eliminated if the same criteria are used in further research.

From the analysis of intercorrelation among variables for each of the five universities, including a sixth criterion measure, practical ability in clothing construction as measured by garment scores, it was found that the results for University A most closely resembled those found from the analysis of the four universities combined. Few significant correlations were found among variables for University B. The findings regarding Criterion 6, practical ability in clothing construction, indicate that performance in clothing construction as measured by garment scores was not effective as a criterion. This variable correlated significantly at least at the .05 level with two predictors in University A and with only one predictor in University D. The unreliability among universities on the sample garment scores may be reflected within the universities. If reliability on garment scores could be achieved, these scores could be used as criterion measures for pooled within-university analyses in future research. If garment scores are used, the predictors which measured finger dexterity background experience and which were found to be ineffective in this research might be found to be effective in predicting this criterion.

Results of the correlations of the composite weighted predictor scores with the composite weighted criterion scores showed that only in University C was the correlation significant beyond the .05 level.

In all of the analyses computed for each university, data for small numbers of students were used. Although comments are made on some of the findings, no definite conclusions can be drawn from the results.
Recommendations

Because University B was different from the other four participating universities on posttest results and on the correlation of variables, it is recommended that in further research dealing with prediction of ability in elementary clothing construction courses in universities of the Maritime region, University B be excluded in the immediate years ahead.

It is recommended that placement procedures be used in Universities A, C, D, and E, and that course objectives and learning experiences be adjusted to accommodate differences among students in levels of cognitive ability in clothing construction and in extent of previous education and experience in clothing construction. If feasible, grouping of students should be employed based on levels of cognitive ability and extent of previous education and experience in clothing construction. If it is not feasible to use homogeneous grouping because of small class size or difficulty with scheduling, individualized instruction could be utilized.

It is recommended that the instructors in Universities A, C, D, and E meet and examine the common objectives identified in this research and determine if other common objectives could be included in the courses to make them more comparable.

It is recommended that further research be conducted in clothing construction in the four universities and that:

1. Test items which were found to have unacceptable difficulty indices, low discriminating power, and unselected response options be examined and necessary changes be made
2. Additional test items be sought to measure cognitive ability on the objectives for which there were no test items

3. Efforts be made to achieve reliability on garment scores

4. If reliability of garment scores is established, these scores be used as criterion measures in pooled within-university analyses, and the finger dexterity background experiences be tested to determine if they are effective predictors of practical ability in clothing construction as measured by garment scores

5. If small proportions of students have learned clothing construction in a 4-H program, this predictor be eliminated

6. Additional measures of enjoyment of sewing be developed and used

7. Assuming no major differences in students from year to year, data be collected on students in clothing construction in each university over several years to obtain sufficient numbers for reliable analysis of data for each university

8. Weights for variables be adjusted based on their relative effectiveness and that these weights be tested using composite predictor and criterion scores.
LITERATURE CITED


Hoskins, Mercedes Nelson. Construction of a basic clothing pretest for use in the colleges and universities in New Mexico. Las Cruces, New Mexico: New Mexico State University, 1959.


ACKNOWLEDGEMENTS

The writer expresses sincere appreciation to her major professor, Dr. Marguerite Scruggs, Associate Dean of the College of Home Economics, Iowa State University, who gave generously of her time, guidance, and encouragement in directing this research.

Gratitude is expressed to members of the researcher's graduate committee, Dr. Margaret Warning, Head, Textiles and Clothing Department, Iowa State University, Dr. Alyce Fanslow, Dr. Milton Brown, and Dr. George Kizer, for their guidance and encouragement, and to Dr. Leroy Wolins, Statistical Consultant, for his advice and assistance regarding statistical analysis.

The writer is grateful to the instructors and students of clothing construction in the participating universities whose interest and generous cooperation were sources of encouragement.

Special thanks is extended to Jim and Judy Wolf who generously assumed responsibility for proofreading and reproduction of this dissertation and for assembling and distributing copies to committee members during the writer's absence from Iowa State University.
APPENDIX A: LETTER OF REQUEST AND RESPONSE FORM
Letter of Request

Copies sent to chairmen of Home Economics Departments of the following universities:

Acadia University, Wolfville, Nova Scotia
Mount St. Vincent University, Halifax, Nova Scotia
St. Francis Xavier University, Antigonish, Nova Scotia
University of Moncton, Moncton, New Brunswick
University of Prince Edward Island, Charlottetown, Prince Edward Island

July 17, 1972

Dear ________________:

Sister Irene Burge, assistant-professor of Home Economics at the University of Prince Edward Island, is a graduate student at Iowa State University pursuing studies leading to a Ph.D. degree in Home Economics Education with a minor in Textiles and Clothing. For her research project she proposes to determine whether it is possible to develop a placement test for use in the beginning clothing construction course in the universities of the Maritime Provinces. Sister Irene hopes that the development of such a test will make a useful contribution to instruction in clothing construction in the universities. Experiences of the Textiles and Clothing Department at Iowa State University with placement tests have been rewarding.

The project involves the cooperation of the students and teacher(s) of the beginning course in clothing construction. Specifically it would include the administration of a placement test and background questionnaire to the students at the beginning of the course. This would take approximately one hour. It would also involve the assistance of the teachers in determining the appropriateness of the test, and in standardizing evaluation of student achievement at the completion of the course.

We hope that you will be willing to have your department cooperate with Sister Burge in this study and ask your permission to contact the teacher(s) of the beginning clothing construction course regarding this project. If you express willingness to participate in this project, contact will be made with the teachers by letter and in person by Sister Burge.
Dr. Margaret Warning, head of the Textiles and Clothing Department of Iowa State University, is also on Sister Burge's committee. She has expressed approval of her research proposal.

Please reply on the enclosed form. Thank you for your consideration of this request. Since the teachers will need to be contacted prior to the beginning of the fall term, we shall appreciate hearing from you at your earliest convenience.

Sincerely yours,

Marguerite Scruggs
Associate Dean
College of Home Economics
Check (X)

______ Yes

______ No

I am willing for our department to participate in the research project proposed by Sister Burge.

You may contact the following teacher(s) of the beginning clothing construction course.

(Name)

(Address)

(Name)

(Address)

These teachers will be available at the above address by

(Date)

Signed: __________________________

______________________________

______________________________
APPENDIX B: COURSE OBJECTIVES QUESTIONNAIRE
Course Objectives Questionnaire

Attached is a list of items that pertain to the first course in clothing construction. Please indicate the degree of emphasis you place on (1) the learning or comprehension of the principles involved in each aspect and (2) the application of the principles by the students. In order to identify the degree of emphasis you place on both the behaviors and the principles involved in these items, use the numbers 1 through 9 according to the following scale:

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1 means that you are completely certain that no emphasis is given to the item, or in other words, the item is not part of the planned program in the clothing construction course.

You may use any number from 1 to 5 to indicate the extent to which you are certain that you do not emphasize the item.

5 means that you are uncertain as to whether the item is emphasized or not.

You may use any number from 5 to 9 to indicate the extent to which you are certain that you do emphasize the item.

9 means that you are completely certain that the item is emphasized, or in other words, it is a major objective of the course.

In the first space before the item place the number which best identifies the emphasis you place on the learning of the principle involved. In the second space before the item place the number which best describes the emphasis you place on the application of the principle by the students.
Comprehension of Principle | Application of principle by students | Items
--- | --- | ---
 | | I. Before construction of a garment:
 | | 1. choosing equipment
 | | 2. taking body measurements
 | | 3. checking pattern type and size
 | | 4. choosing the pattern
 | | 5. selecting correct yardage
 | | 6. understanding the pattern
 | | 7. altering the pattern
 | | 8. preparing the material before cutting
 | | 9. placing the pattern on the fabric
 | | 10. pinning the pattern to the fabric
 | | 11. cutting out the garment pieces
 | | 12. marking the garment pieces

 | | II. During construction of a garment:
 | | 1. developing desirable work habits
 | | 2. using the sewing machine
 | | 3. using fundamental hand stitches
 | | 4. making adjustments in garments
 | | 5. using proper techniques of pressing

 | | III. Construction of a garment:
 | | 1. using staystitching
 | | 2. constructing darts
### Comprehension Application of Principle by Students

<table>
<thead>
<tr>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. constructing seams</td>
</tr>
<tr>
<td>4. selecting appropriate seam finishes</td>
</tr>
<tr>
<td>5. using interfacing</td>
</tr>
<tr>
<td>6. using facings</td>
</tr>
<tr>
<td>7. using trimming and clipping techniques</td>
</tr>
<tr>
<td>8. using linings</td>
</tr>
<tr>
<td>9. making hand worked buttonholes</td>
</tr>
<tr>
<td>10. making bound buttonholes</td>
</tr>
<tr>
<td>11. applying collars</td>
</tr>
<tr>
<td>12. inserting sleeves</td>
</tr>
<tr>
<td>13. constructing hems</td>
</tr>
<tr>
<td>14. applying slide fasteners</td>
</tr>
<tr>
<td>15. selecting and applying other fasteners</td>
</tr>
</tbody>
</table>

List other major aspects of clothing construction which you include in your clothing construction course.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
APPENDIX C: INSTRUCTOR INTERVIEW QUESTIONNAIRE
Instructor Interview Questionnaire

1. Do you group your students into sections within the class according to level of ability and scope of knowledge? If so, on what basis do you do this?

2. Do you think there is a need for placement of students in your beginning clothing construction course based on different degrees of knowledge and different levels of ability? Reasons (for or against)

3. Do you think that this proposed placement test would be important to your particular program?

4. Do you think the test represents a fair sampling of content and objectives of your clothing construction course? If there are any items which you do not include in your course please identify them by number.

5. Are there items on the test which you think are inappropriate for students in your province? If so, please identify these by number.

6. Is the beginning course in clothing construction required for all home economics students in your university? If not, for what major is it required?

7. Do students from other curricula take the beginning clothing construction course as an elective?
APPENDIX D: PLACEMENT TEST FOR A BEGINNING CLOTHING CONSTRUCTION COURSE
PURPOSE OF THE TEST

The purpose of this test is to help determine whether it can be used in universities for student placement in sections within clothing construction courses in the future. If students can be grouped according to similarities in level of knowledge this could greatly help in providing the learning experiences that are most helpful to the students.

The results of this test will not in any way influence the grade that you will get in your clothing construction course or in any other course. The results will be used as a basis for continuing to improve courses for students.

ARRANGEMENT OF THE TEST

All of the items on the test are objective type items. Some are matching items, some are true-false items while others are multiple-choice items. There is no arrangement of the test items according to type. The arrangement is a logical arrangement according to a step-by-step procedure used in the actual construction of a garment.

RESPONDING TO TEST ITEMS

A special answer sheet is to be used for recording your responses. Please put all answers on this answer sheet, making sure that the number of the answer corresponds to the number of the question in each case. Mark only one answer to each question. PLEASE READ THE DIRECTIONS FOR RECORDING YOUR RESPONSE on this particular answer sheet. These directions appear on the upper left-hand corner of the answer sheet.

PLEASE READ EACH QUESTION CAREFULLY. Do your best. If there is any question which you do not understand please make a note of this on the back of your answer sheet.
1. To take an accurate measurement of the hips one would measure around the hips:

1. 7 inches below the waist.
2. 7 to 9 inches below the waist.
3. at the fullest part.

2. From the information given below mark the correct selection for the yardage needed to make the skirt and sleeveless jacket of a \(\frac{3}{4}\) inch, small uneven (unbalanced) plaid fabric in a size 12. (The repeating lines of the plaid design are \(\frac{3}{4}\) inch apart.)

<table>
<thead>
<tr>
<th>Fabric required</th>
<th>Sizes 10</th>
<th>12</th>
<th>14</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skirt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\frac{1}{4})&quot; to (\frac{3}{4})&quot; with nap</td>
<td>1 1/2</td>
<td>1 5/8</td>
<td>1 3/4</td>
<td>1 3/4</td>
</tr>
<tr>
<td>(\frac{1}{4})&quot; to (\frac{3}{4})&quot; without nap</td>
<td>1 1/8</td>
<td>1 1/4</td>
<td>1 3/8</td>
<td>1 3/8</td>
</tr>
<tr>
<td>5(\frac{1}{4})&quot; without nap</td>
<td>1 1/8</td>
<td>1 1/8</td>
<td>1 1/8</td>
<td>1 1/8</td>
</tr>
<tr>
<td>Jacket with Sleeves</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\frac{1}{4})&quot; or (\frac{3}{4})&quot; with nap</td>
<td>1 3/4</td>
<td>1 7/8</td>
<td>2 1/4</td>
<td>2 1/4</td>
</tr>
<tr>
<td>(\frac{1}{4})&quot; or (\frac{3}{4})&quot; without nap</td>
<td>1 3/4</td>
<td>1 7/8</td>
<td>2 1/4</td>
<td>2 1/4</td>
</tr>
<tr>
<td>5(\frac{1}{4})&quot; without nap</td>
<td>1 5/8</td>
<td>1 5/8</td>
<td>1 5/8</td>
<td>1 3/4</td>
</tr>
<tr>
<td>Sleeveless Jacket</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\frac{1}{4})&quot; or (\frac{3}{4})&quot; with or without nap</td>
<td>1 5/8</td>
<td>1 5/8</td>
<td>1 3/4</td>
<td>1 3/4</td>
</tr>
<tr>
<td>5(\frac{1}{4})&quot; without nap</td>
<td>1 1/2</td>
<td>1 1/2</td>
<td>1 1/2</td>
<td>1 1/2</td>
</tr>
</tbody>
</table>

1. 2 \(\frac{5}{8}\) yards
2. 2 \(\frac{3}{4}\) yards
3. 3 yards
4. 3 \(\frac{1}{4}\) yards
5. 3 \(\frac{5}{8}\) yards

3. In preparing to place pattern pieces on 2 yards of cotton fabric (without a permanent-press finish), Joan finds that when the two selvages are placed together, the torn ends of the fabric are not even. To straighten the fabric she should:

1. stretch the fabric by pulling the short corner of each end.
2. stretch the fabric by pulling the long corner of each end.
3. stretch the fabric by pulling on true bias to lengthen the short corners.
4. trim the ends so that they are even.
4. A student has taken her measurements and now proceeds to determine the correct pattern type and size for her figure. Her measurements are as follows:

- **Bust**: 33 inches
- **Waist**: 25 inches
- **Hips**: 37½ inches
- **Back waist length**: 15 3/8 inches

From the information below, which pattern type and size would be the best choice for the student?

<table>
<thead>
<tr>
<th>Junior</th>
<th>Size</th>
<th>9</th>
<th>11</th>
<th>13</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bust</strong></td>
<td></td>
<td>32</td>
<td>33 ½</td>
<td>35</td>
<td>37</td>
</tr>
<tr>
<td><strong>Waist</strong></td>
<td></td>
<td>23 ½</td>
<td>24 ½</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td><strong>Hips</strong></td>
<td></td>
<td>34</td>
<td>35 ½</td>
<td>37</td>
<td>39</td>
</tr>
<tr>
<td><strong>Back Waist</strong></td>
<td></td>
<td>15 ½</td>
<td>15 3/4</td>
<td>16</td>
<td>16 ¼</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Misses'</th>
<th>Size</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bust</strong></td>
<td></td>
<td>31 ½</td>
<td>32 ½</td>
<td>34</td>
<td>36</td>
</tr>
<tr>
<td><strong>Waist</strong></td>
<td></td>
<td>23</td>
<td>24</td>
<td>25 ½</td>
<td>27</td>
</tr>
<tr>
<td><strong>Hips</strong></td>
<td></td>
<td>33 ½</td>
<td>34 ½</td>
<td>36</td>
<td>38</td>
</tr>
<tr>
<td><strong>Back Waist</strong></td>
<td></td>
<td>15 3/4</td>
<td>16</td>
<td>16 ¼</td>
<td>16 ½</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Junior size 11
2. Junior size 13
3. Misses' size 10
4. Misses' size 12
5. None of the above

5. Why would the pattern type and size selected in question 4 be the best selection for the student?

1. least number of alterations would need to be made for best fit
2. least complicated alterations would need to be made for best fit
3. no alterations would be needed as the ease allowed in the pattern would be sufficient for proper fit

6. When selecting a pattern for slacks, shorts and fitted skirts, one should select the pattern according to:

1. the waist measurement because it would be easier to alter the hipline than the waist and still maintain the proper curve at the side seam
2. the hip measurement because it is easier to alter the waistline than the hips by changing darts and seams located there
3. either measurement because it makes little difference in the alterations required for best fit in the waist and hip area of the garment
Items 7 through 16 refer to the pattern diagrams on the opposite page. Column A contains partial statements about the pattern markings and column B contains possible completions to these statements. Choose from items in column B the best completion for each partial statement in column A.

<table>
<thead>
<tr>
<th>A</th>
<th>Pattern Markings</th>
<th>B</th>
<th>Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Pattern marking No. 1 refers to:</td>
<td></td>
<td>1. buttonhole placement</td>
</tr>
<tr>
<td>8</td>
<td>Pattern marking No. 2 refers to:</td>
<td></td>
<td>2. center front</td>
</tr>
<tr>
<td>9</td>
<td>Pattern marking No. 3 refers to:</td>
<td></td>
<td>3. straight grain</td>
</tr>
<tr>
<td>10</td>
<td>Pattern marking No. 4 refers to:</td>
<td></td>
<td>4. bias grain</td>
</tr>
<tr>
<td>11</td>
<td>Pattern marking No. 5 refers to:</td>
<td></td>
<td>5. front fold line</td>
</tr>
<tr>
<td>12</td>
<td>Pattern marking No. 6 refers to:</td>
<td></td>
<td>1. stitching line of dart</td>
</tr>
<tr>
<td>13</td>
<td>Pattern marking No. 7 refers to:</td>
<td></td>
<td>2. fold line of dart</td>
</tr>
<tr>
<td>14</td>
<td>Pattern marking No. 8 refers to:</td>
<td></td>
<td>3. stitching line of tuck</td>
</tr>
<tr>
<td>15</td>
<td>The purpose of pattern marking No. 9 is to indicate:</td>
<td></td>
<td>4. fold line of tuck</td>
</tr>
<tr>
<td>16</td>
<td>The function of pattern marking No. 10 is to indicate:</td>
<td></td>
<td>1. center front</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. alteration line</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. fold line</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. natural waistline</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. seam line</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. cutting line</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. seam allowance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. pattern margin</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. seam clipping</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. width of seam allowance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. where to end ease stitching</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. where to place ease when joining seams</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. where to join another garment piece</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. where to clip</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. where to match construction points</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. where to adjust for easing of fabric</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. stitching line for proper seam size</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. placement in left or right armhole</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. proper grain of fabric piece</td>
</tr>
</tbody>
</table>
Items 17 through 21 refer to the diagram below representing a piece of fabric. Select the term which identifies the grain line represented by each numbered arrow.

<table>
<thead>
<tr>
<th>Numbered arrows</th>
<th>Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. No. 1 refers to:</td>
<td>1. crosswise grain</td>
</tr>
<tr>
<td>18. No. 2 refers to:</td>
<td>2. lengthwise grain</td>
</tr>
<tr>
<td>19. No. 3 refers to:</td>
<td>3. garment bias</td>
</tr>
<tr>
<td>20. No. 4 refers to:</td>
<td>4. true bias</td>
</tr>
<tr>
<td>21. No. 5 refers to:</td>
<td></td>
</tr>
</tbody>
</table>

22. Which of the following has the greatest stretch?

1. crosswise grain
2. lengthwise grain
3. garment bias
4. true bias

23. Which of the following has the least amount of stretch?

1. crosswise grain
2. lengthwise grain
3. garment bias
4. true bias
24. If a straight 3-gored skirt pattern is 2 inches too small through the hips but is the correct measurement at the waist, which of the methods given is not an acceptable way to alter the skirt?

1. Slashing each pattern piece up from the hem to the waistline and spreading each piece \( \frac{1}{2} \) inch at the hipline.
2. Adding \( \frac{1}{2} \) inch on the side seams up to the hipline and from there tapering to the seamline at the waistline.
3. Laying center front and back pattern lines \( \frac{1}{2} \) inch from the fabric fold or selvage and fitting the skirt fabric to the waistline by making larger darts.
4. Adding \( \frac{1}{2} \) inch on the entire side seams and fitting the skirt to the waistline by making the darts larger.

Items 25 and 26 refer to the garment sketched on this page. Select the correct solution for each situation described.

25. If the upper bodice (back waist length) is 1 inch too long you should shorten the pattern by:

1. trimming off 1 inch at the lower edge of the bodice pattern.
2. folding a \( \frac{1}{2} \) inch horizontal pleat in the pattern between the waistline and lower edge, keeping lengthwise grain straight.
3. folding a \( \frac{1}{2} \) inch horizontal pleat in the pattern between the armseye and waistline, keeping lengthwise grain straight.

26. If the bust dart of the dress is 1 inch too low, you should raise it by:

1. marking a new line to the bust point and drawing dartlines to correspond to that line; then correct cutting line.
2. folding a \( \frac{1}{2} \) inch pleat across the bodice front above the dart keeping center front straight.
3. extending the point of the dart by 1 inch and then redrawing the stitching and folding lines of the dart.
4. folding a \( \frac{1}{2} \) inch pleat above the dart and spreading the same amount (\( \frac{1}{2} \)) below the bust dart.
Items 27 through 33 are several statements about the pattern layouts on pages 5 and 6a. Printed side of all pattern pieces is placed right side up in the layouts illustrated. The diagram above left shows how the dress pattern looks when made up in fabric. The dress has a Peter-Pan collar, center back seam and front closing. Mark in answer space 1 if the statement is true. Mark in answer space 2 if the statement is false.

27. In layout III, the collar is placed on the correct grain.
28. Layouts I and II provide for faced collars.
29. In layout II, both sleeves are for the same arm.
30. In layouts I and III, all pattern sections are correctly placed on proper grain.
31. Layout III provides for a collar that is placed on crosswise grain.
32. In layouts I and III, the pattern pieces are correctly placed for a napped or pile fabric.
33. Layout III provides for too many facings.
Select the best method of marking the following fabrics.

<table>
<thead>
<tr>
<th>Type of fabric</th>
<th>Method of marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>34. All-acrylic fur-like pile fabric</td>
<td>1. tracing wheel and tracing paper</td>
</tr>
<tr>
<td>35. Bulky wool fabric</td>
<td>2. tailor’s chalk or chalk pencil</td>
</tr>
<tr>
<td>36. Navy blue denim</td>
<td>3. tailor’s tacks</td>
</tr>
<tr>
<td></td>
<td>4. wax chalk</td>
</tr>
</tbody>
</table>

Items 37 through 48 refer to the process of unit construction in making a dress. (Unit construction is the assembling of garment sections that make a unit before joining units. All stitching and pressing are completed before each unit is joined to another which means less handling, improved organization of work, more effective use of time, and a better overall appearance of the garment.) Read through the processes listed below which refer to the dress diagrammed on the opposite page.

If Process A should be done before Process B, mark in answer space 1. If Process A should be done after Process B, mark in answer space 2. If it makes no difference which process is done first, mark in answer space 3.

**Process A**

37. Attach collar
38. Join shoulder seams
39. Join facing to dress
40. Stitch back neckline darts
41. Attach collar
42. Attach buttons
43. Put an ease stitch around upper sleeve cap
44. Set in sleeve
45. Make bound buttonholes
46. Clip neckline seam
47. Make machine worked buttonholes
48. Press curved side front seam open

**Process B**

Join underarm seams
Join side front and front sections
Edgestitch outer edge of facing
Stitch back waistline darts
Set in sleeves
Sew hem of skirt in place
Join underarm sleeve seam
Join underarm seams
Stitch facing to dress
Understitch neckline seam
Understitch front facing
Clip curved side front seam
49. The purpose of staystitching is:
   1. to prevent ravelling while the garment is being made
   2. to prevent stretching of the garment bias edges
   3. to provide a guideline for sewing seams
   4. to ease one piece of a garment so that it fits another piece

50. The process of understitching consists of:
   1. stitching close to the outer edge of the facing after the raw edge has been turned under
   2. stitching both seam allowances to the facing side of a garment
   3. stitching ⅛ inch from the raw edge of the facing before turning under
   4. stitching ½ inch from raw edge of garment to prevent ravelling

51. Which of the following is not an important consideration in using woven interfacings?
   1. the weight of the interfacing in relation to the weight of the garment fabric
   2. correct grain and shrinkage
   3. fiber content and care
   4. placement of the right or wrong side of interfacing on the garment piece
   5. trimming off the corner of the interfacing inside the seam line before stitching it in place.

52. The main function of lining in an A-line wool skirt is to:
   1. conceal construction details
   2. give body and crispness to garment details
   3. reduce stretching of garment fabric
   4. give strength to parts of the garment under strain

   Every procedure recommended in the construction of a garment has an effect on the finished garment. Read the results of omitting certain construction procedures in statements 53 through 57. Select the number of the procedure that was not done in each situation.

<table>
<thead>
<tr>
<th>Situation</th>
<th>Procedures that were omitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>53. The collar corners are bulky</td>
<td>1. clipping</td>
</tr>
<tr>
<td>54. The shoulder seam of a dress back is too long for the front shoulder seam</td>
<td>2. trimming</td>
</tr>
<tr>
<td>55. The neckline does not lie flat inside the finished garment</td>
<td>3. layering (or grading)</td>
</tr>
<tr>
<td></td>
<td>4. edgestitching</td>
</tr>
<tr>
<td></td>
<td>5. easing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Situation</th>
<th>Procedures that were omitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>56. Waistline facing on skirt with no band shows on right side when skirt is worn</td>
<td>1. facing</td>
</tr>
<tr>
<td>57. Crosswise cut waistband is stretched</td>
<td>2. interfacing</td>
</tr>
<tr>
<td></td>
<td>3. underlining</td>
</tr>
<tr>
<td></td>
<td>4. understitching</td>
</tr>
<tr>
<td></td>
<td>5. edgestitching</td>
</tr>
</tbody>
</table>
Fasteners (hooks, eyes and snaps) are often used to secure closings in garments. Items 58 through 61 deal with the selection and application of fasteners. Which of these statements are true? Mark in answer space 1 if the statement is true. Mark in answer space 2 if the statement is false.

58. Hooks are usually placed on the underside of the overlap.

59. Snaps are preferred to hooks and eyes on parts of garments subject to strain.

60. The ball of the snap is usually placed on the underlap.

61. Straight eyes, in preference to round eyes, are used when openings overlap.

62. Bias strips have been cut from the fabric shown on the right. Assuming that it is important to match the fabric, which of the seams illustrated below has been correctly joined in making a continuous bias strip?

Items 63 through 65 refer to the diagrammed garment areas where clipping is needed to improve the outward appearance of the garment. Which one of the following methods would be appropriate for each of the garment pieces indicated?

Methods
1. slashing seam allowance
2. notching seam allowance
66. In layering (grading) the seam allowances of a neckline after the facing has been applied on a collarless dress, which seam allowance should be left the longest?

1. facing seam allowance
2. garment seam allowance
3. interfacing seam allowance

67. The stitching of the underlap of a lapped zipper placket should extend from end to end of the:

1. zipper tape
2. metal part of the zipper
3. placket opening

68. Pressing differs from ironing. Which of the following statements is not correct?

1. pressing is a sliding motion of the iron on the fabric
2. pressing is always done in the direction of the fabric grain
3. pressing involves the use of moisture
4. curved seams should be pressed over a curved surface

Items 69 through 72 deal with techniques of pressing various garment details. Select the pressing technique on the right which is best for each case.

69. Shoulder seam dart on raglan sleeve
   Choices
   1. press open
   2. press towards center
   3. press to one side
   4. press up
   5. press down

70. Diagonal bust dart (from hipline on side seam to bust) in bulky doubleknit dress

71. Waistline darts on a cotton skirt

72. Waistline seam of dress

Items 73 through 75 deal with techniques for finishing facings. Three methods commonly used for finishing the raw edges of a neckline facing are listed below.

1. Turn under edge and machine stitch, then hand tack at shoulder seams.
2. Turn under edge and hand stitch in place.
3. Zig-zag edge and hand tack at shoulder seams.

Which of the above methods would give a neat finish on the inside without being conspicuous on the right side of the following garments?

73. A cotton dress which has a Peter Pan collar attached with a bias strip facing. How should the neckline facing be finished?

74. A gingham blouse with a fitted facing on the neck and down the front. How should the neckline facing be finished?

75. A medium weight wool jacket with a facing around the neck and down the front. (Jacket is unlined.) How should the neckline facing be finished?
Items 76 through 81 deal with hemming procedures. Methods commonly used for finishing hems are described as follows:
1. Raw edge turned under and stitched by machine, then blind stitched in place by hand.
2. Raw edge zig-zagged and feather-stitched or catch-stitched in place by hand.
3. Raw edge turned under and stitched by machine to garment.
4. Seam tape stitched to cover raw edge, then tape blind stitched in place.
5. Raw edge left unfinished, then feather-stitched or catch-stitched in place.

From the above descriptions, select the method that would be most suitable for hemming the garments listed below. Choices may be selected more than once.

76. Dacron/cotton poplin pant-skirt
77. Wool flannel dress with semi-flared skirt
78. Double knit dress
79. Denim slacks
80. Flannel nightgown

81. In turning up and marking the hem depth of an A-line skirt, you should turn up the hem on the marked hemline and then:
1. adjust fullness along cut edge and hand stitch in place.
2. pin hem in position at all seams and handstitch in place.
3. make hem even in width, adjust fullness near seams, and hand stitch in place.
4. adjust fold so that hem depth will be even, adjust fullness near seams, and hand stitch in place.

In items 82 through 86 select the best type of stitching for each construction technique listed.

82. Gathering
83. Easing
84. Staystitching
85. Machine basting
86. Reinforcement

Choices
1. regular length of stitches (12 to 14 per inch)
2. longest stitch—6 per inch
3. shorter stitch—16 or more per inch
4. slightly lengthened stitch (8 to 10 per inch)
Items 87 through 89 are statements of difficulties resulting from improper operation of a sewing machine. Select the most probable cause for each difficulty listed.

<table>
<thead>
<tr>
<th>Difficulties</th>
<th>Cause of difficulties</th>
</tr>
</thead>
<tbody>
<tr>
<td>87. The machine skips stitches</td>
<td>1. improper stitch length</td>
</tr>
<tr>
<td>88. The thread lies straight on the underside of the fabric while the thread on the upper side seems normal</td>
<td>2. improper insertion of needle</td>
</tr>
<tr>
<td>89. The spool thread is loose or piles up along the stitching line</td>
<td>3. improper machine threading</td>
</tr>
<tr>
<td></td>
<td>4. bobbin tension is too tight</td>
</tr>
<tr>
<td></td>
<td>5. improper insertion of bobbin</td>
</tr>
</tbody>
</table>

Items 90 through 93 refer to seams and seam finishes. The diagrams below illustrate various types of seams and seam finishes. Select the number of the seam or seam finish that is the best choice for the garments listed.

Seams and seam finishes

1. French seam
2. Plain seam with edges turned under and stitched
3. Plain seam with edges zig zagged
4. Plain seam with no finish along single edges
5. Flat felled seam

90. Blouse of Dacron/cotton voile—side, shoulder and underarm seams
91. Medium weight, loosely woven, unlined wool skirt—side seams
92. Tailored shirt or blouse
93. Finely woven wool dress—side seams

94. The length of a buttonhole is determined by the:
   1. diameter of the button
   2. diameter of the button plus 1/8 inch
   3. diameter of the button plus thickness of the button
   4. buttonhole markings printed on the pattern
95. Below are diagrams showing the placement of buttonholes in relation to the center front of a blouse. Dotted line indicates center front blouse; solid line indicates front edge of blouse. Which placement is correct?

96. In the diagrams below showing the placement of buttons in relation to the center front of a blouse, the dotted line indicates the center front of the blouse; solid line indicates front edge of blouse. Which placement is correct?

97. The construction of bound buttonholes is begun:
1. after the facing has been applied to the garment
2. after the interfacing has been applied to the garment
3. before the interfacing has been applied to the garment

98. For a bound buttonhole the binding strip should be placed:
1. with wrong side of strip on wrong side of garment
2. with right side of strip on wrong side of garment
3. with wrong side of strip on right side of garment
4. with right side of strip on right side of garment
APPENDIX E: BACKGROUND EXPERIENCE QUESTIONNAIRE
Background Experience Questionnaire
To: Research study participants
From: Sister Irene Burge, Assistant Professor of home economics at the University of Prince Edward Island, and graduate student in home economics education at Iowa State University.

You can help a great deal in the placement test research by answering the questions which follow as completely and accurately as possible. Your answers will be kept confidential and will have no effect on your grade in this or any other class.

If you have questions, comments or additional information which you wish to give concerning your experience in clothing construction please feel free to do so on the back of the questionnaire.

Thank you for your cooperation and help in this research project.

PLACEMENT TEST RESEARCH
Questionnaire for Students

Name ____________________________
(Last) (First) (Middle)

1. Classification (circle one) Fr. Soph. Jr. Sr. Other (specify)

2. In which curriculum are you enrolled?

3. Check the types of garments you have constructed in the past TWO YEARS by listing in the appropriate spaces below the number of each type of garment you made.

<table>
<thead>
<tr>
<th>Garment Type</th>
<th>Cotton</th>
<th>Wool</th>
<th>Man-made Fabric</th>
<th>Bonded Fabric</th>
<th>Napped &amp; Pile fabric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skirts, lined</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skirts, unlined</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blouses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleeveless dresses or jumpers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dresses with sleeves</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slacks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Continue on next page
4. What percentage of your own clothing have you made in the past TWO YEARS? ______ percent

5. Have you learned clothing construction in school? (Please check)
   *YES ______
   NO ______

6. *If YES Circle the grade in which you had clothing construction and indicate the length of time you spent on it in class during that grade by placing a number in the space opposite the circled grade according to the following code:
   1 means you had clothing construction for less than a semester
   2 means you had clothing construction for one semester
   3 means you had clothing construction for two semesters (or for a full year)
   7th grade ______
   8th grade ______
   9th grade ______
   10th grade ______
   11th grade ______
   12th grade ______

7. Have you learned clothing construction in 4-H? *YES ______ NO ______

8. *If YES Indicate how many years you spent in the course.
   (Circle one) 1  2  3  4  5 or more
9. Have you learned clothing construction at home? YES ___ NO ___

10. Have you learned clothing construction some place not mentioned above? YES ___ NO ___
    If you answered YES, please specify __________________________
    __________________________

11. Do you make your own clothing? YES ___ NO ___ If so, how long have you been making your own clothing? _______ years

12. Do you knit? YES ___ NO ___

13. Do you crochet? YES ___ NO ___

14. Have you made doll clothes? YES ___ NO ___

15. How many years have you played piano? _______ years

16. How many years have you played organ? _______ years

17. Do you type? YES ___ NO ___ If YES, what was your best typing speed in number of words per minute?
APPENDIX F: GUIDELINES FOR ADMINISTRATION OF PLACEMENT TEST AND BACKGROUND EXPERIENCE QUESTIONNAIRE
Guidelines for Administration of Placement Test and Background Experience Questionnaire

Instruction to be Given to the Students

Educational research is of paramount importance for the development and improvement of educational programs. Much of this research is carried out by students during the course of graduate work. Often students in the undergraduate college program are asked to cooperate with research so that realistic recommendations for change and improvement can be made.

The placement test and questionnaire which you are asked to complete constitute a part of a research project being conducted by Sister Irene Burge who is a graduate student at Iowa State University. Your cooperation in responding to the test and questionnaire are of utmost importance. You will be making an important contribution to the further development and improvement of beginning clothing courses.

Please read carefully all instructions and questions on both the test and questionnaire and do your best in responding to both of these instruments. Do not write on the test booklet, but be sure to put your name on the questionnaire and test answer sheet. Submit the test booklets, questionnaires and answer sheets to me when you have completed them.

To the Instructor

Please be sure that all test booklets, answer sheets, and questionnaires are returned to you. Mail to me all copies of completed and uncompleted questionnaires and answer sheets as well as all test booklets. Revisions will most probably be made in the test and questionnaire as a result of your and the students' reactions to them. When revisions are completed I shall be happy to give you a copy of the test. I shall be happy to share the results of my research with you also.

Thank you very much.

Sister Irene Burge
Home Economics Department
University of Prince Edward Island
Charlottetown, P.E.I.
APPENDIX G: INSTRUMENTS FOR SCORING GARMENTS
Instruments for Scoring Garments

For scoring each garment please use the scale illustrated and described below.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>CERTAIN the quality of construction is UNSATISFACTORY</td>
<td>UNCERTAIN if the quality of construction is SATISFACTORY or UNSATISFACTORY</td>
<td>CERTAIN the quality of construction is SATISFACTORY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the blank to the left of each of the items listed on the score sheets place a number from 1 to 9 according to the following description:

1 means you are certain that the quality of construction of the technique listed is unsatisfactory.

2-4 You may use the numbers between 1 and 5 to indicate the extent to which you are certain the quality of construction is unsatisfactory.

5 means you are uncertain if the quality of construction is satisfactory or unsatisfactory.

6-8 You may use the numbers between 5 and 9 to indicate the extent to which you are certain that the quality of construction is satisfactory.

9 means you are certain that the quality of construction is satisfactory.

If the garment is lined, also place a number in the blank to the right of the item listed to record the score for the lining.

If a listed construction technique is not included in the garment being scored, please place n a in the blank (n a = not applicable).
# Score Sheet for Dress, Tunic or Blouse

<table>
<thead>
<tr>
<th>Garment Score</th>
<th>Lining Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## 1. Choice of Fabric and Findings
- a. Type and size of pattern for student
- b. Type and weight of fabric for garment
- c. Color harmony of fabric and findings
- d. Type and weight of interfacing

## 2. Alterations
- a. Use of appropriate method
- b. Effectiveness of alterations

## 3. Machine Stitching
- a. Tension (upper & lower)
- b. Straightness of top-stitching (if any)

## 4. Cutting
- a. Grain line of all garment pieces
- b. Accuracy of cutting

## 5. Marking
- a. Appropriate choice of method
- b. Accuracy of marking
- c. Inconspicuousness of marks

## 6. Darts
- a. Matching of stitching lines
- b. Accuracy of stitching
- c. Smoothness at point
- d. Thread ends secured
- e. Trimming (if necessary)
- f. Pressing (direction & amount)
- g. Appearance from right side

## 7. Tucks, Gathers, Pleats
- a. Spacing
- b. Stitching
- c. Pressing

## 8. Seams
- a. Straightness of stitching
- b. Evenness of width
- c. Amount of seam allowance
- d. Appropriate finish (inconspicuous from right side)
- e. Pressing
- f. Matching of fabric (if applicable)
9. Interfacing. Consider the following:
a. application to garment  
b. appropriate use

10. Facing. Consider the following:
a. application to garment (shape & grain)  
b. appropriate finish  
c. trimming, layering & clipping

11. Collar. Consider the following:
a. construction (smooth edges & corners, even shape)  
b. trimming, layering & clipping  
c. undercollar invisible from right side  
d. pressing  
e. placement on garment  
f. application to garment

12. Pockets. Consider the following:
a. construction  
b. placement on garment  
c. application to garment

13. Sleeves. Consider the following:
a. construction  
b. placement in garment  
c. application to garment (smoothness of cap or evenness of gathers; even stitching)  
d. pressing  
e. seam finish  
f. cuffs (application, placement)

14. Waistline treatment. Consider the following:
a. matching of construction details  
b. distribution of gathers  
c. joining of waistline seam  
d. elimination of excess bulk

15. Zipper. Consider the following:
a. appropriate type for garment  
b. placement  
c. method of application  
d. application (inconspicuous, neat; smooth placket)  
e. opens and closes smoothly

16. Buttonholes. Consider the following:
a. size  
b. placement (spacing, grain)  
c. size and evenness of bite or welt  
d. finish on underside
Gaxment Lining Score

17. Buttons. Consider the following:
   a. placement
   b. application to garment

18. Other fasteners. Consider the following:
   a. appropriate type
   b. placement on garment
   c. application to garment

19. Hem. Consider the following:
   a. depth (appropriate for style & fabric; even)
   b. appearance from right side (smooth, flat & inconspicuous)
   c. appropriate hem finish
   d. stitching (appropriate type; neat & even)
   e. pressing

20. General appearance. Consider the following:
   a. evidence of logical order in steps of construction
   b. neatness
   c. overall pressing
   d. hang of garment
   e. bias and curved areas smooth & unstretched
   f. arrangement of plaid or other figured design
   g. arrangement of fabric, trim, design & color

If there are construction details on the garment being scored which are not listed above, please itemize these and give your evaluation of the quality of construction of these details using the scale as above.
SCORE SHEET FOR PANTS

Student's name ___________________________ Judge's name ____________
University ______________________________

Garment
Score

1. Choice of fabric and findings. Consider the following:
   a. type and size of pattern for student
   b. type and weight of fabric for garment
   c. color harmony of fabric and findings
   d. type and weight of interfacing

2. Alterations. Consider the following:
   a. use of appropriate method
   b. effectiveness of alterations

3. Machine stitching. Consider the following:
   a. tension (upper & lower)
   b. straightness of top-stitching (if any)

4. Cutting. Consider the following:
   a. grain line of all garment pieces
   b. accuracy of cutting

5. Marking. Consider the following:
   a. appropriate choice of method
   b. accuracy of marking
   c. inconspicuousness of marks

6. Darts. Consider the following:
   a. matching of stitching lines
   b. accuracy of stitching
   c. smoothness at point
   d. thread ends secured
   e. trimming (if necessary)
   f. pressing (direction & amount)
   g. appearance from right side

7. Seams. Consider the following:
   a. straightness of stitching
   b. evenness of width
   c. amount of seam allowance
   d. appropriate finish (inconspicuous from right side)
   e. pressing
   f. matching of fabric (if applicable)
8. Pockets. Consider the following:
   a. construction
   b. placement on garment
   c. application to garment

9. Crotch. Consider the following:
   a. fly neatly constructed
   b. curved seam clipped or trimmed properly

10. Zipper. Consider the following:
    a. appropriate type for garment
    b. placement
    c. method of application
    d. application (inconspicuous, neat; smooth placket)
    e. opens and closes smoothly

11. Buttonholes. Consider the following:
    a. size
    b. placement (spacing, grain)
    c. size and evenness of bite or welt
    d. finish on underside

12. Buttons. Consider the following:
    a. placement
    b. application to garment

13. Waistband. Consider the following:
    a. construction (even in width; even, smooth corners)
    b. application to garment (band edges fit together properly; enclosed seam trimmed & layered)
    c. top-stitching or hand-stitching (neat, even)
    d. fasteners (appropriate type & application)

14. Casing. Consider the following:
    a. evenness of width
    b. evenness of stitching
    c. elastic (proper width; inserted & secured properly)

15. Hem. Consider the following:
    a. depth (appropriate for style & fabric; even)
    b. appearance from right side (smooth, flat & inconspicuous)
    c. appropriate hem finish
    d. stitching (appropriate type; neat & even)
    e. pressing
Garment Score

16. General appearance. Consider the following:
   a. evidence of logical order in steps of construction
   b. neatness
   c. overall pressing
   d. hang of garment
   e. bias and curved areas smooth & unstretched
   f. arrangement of plaid or other figured design
   g. arrangement of fabric, trim, design & color

If there are construction details on the garment being scored which are not listed above, please itemize these and give your evaluation of the quality of construction of these details using the scale as above.
SCORE SHEET FOR SKIRT

Student's name _______________________ Judge's name _______________________

University ___________________________

<table>
<thead>
<tr>
<th>Garment Score</th>
<th>Lining Score</th>
</tr>
</thead>
</table>

1. Choice of fabric and findings. Consider the following:
   a. type and size of pattern for student
   b. type and weight of fabric for garment
   c. color harmony of fabric and findings
   d. type and weight of interfacing

2. Alterations. Consider the following:
   a. use of appropriate method
   b. effectiveness of alterations

3. Machine stitching. Consider the following:
   a. tension (upper & lower)
   b. straightness of top-stitching (if any)

4. Cutting. Consider the following:
   a. grain line of all garment pieces
   b. accuracy of cutting

5. Marking. Consider the following:
   a. appropriate choice of method
   b. accuracy of marking
   c. inconspicuousness of marks

6. Darts. Consider the following:
   a. matching of stitching lines
   b. accuracy of stitching
   c. smoothness at point
   d. thread ends secured
   e. trimming (if necessary)
   f. pressing (direction & amount)
   g. appearance from right side

7. Tucks, gathers, pleats. Consider the following:
   a. spacing
   b. stitching
   c. pressing

8. Seams. Consider the following:
   a. straightness of stitching
   b. evenness of width
   c. amount of seam allowance
   d. appropriate finish (inconspicuous from right side)
   e. pressing
   f. matching of fabric (if applicable)
9. Pockets. Consider the following:
a. construction  
b. placement  
c. attachment to garment  

10. Zipper. Consider the following:  
a. appropriate type for garment  
b. placement  
c. method of application  
d. application (inconspicuous, neat; smooth placket)  
e. opens and closes smoothly  

11. Buttonholes. Consider the following:  
a. size  
b. placement (spacing, grain)  
c. size and evenness of bite or welt  
d. finish on underside  

12. Buttons. Consider the following:  
a. placement  
b. application to garment  

13. Other fasteners. Consider the following:  
a. appropriate type  
b. placement on garment  
c. application to garment  

14. Waistband. Consider the following:  
a. construction (even in width; even, smooth corners)  
b. application to garment (band edges fit together properly; enclosed seam trimmed and layered)  
c. top-stitching or hand-stitching (neat, even)  
d. fasteners (appropriate type and application)  

15. Waistline facing. Consider the following:  
a. construction of facing  
b. finish of facing  
c. application of facing (smooth fitting; seams matching skirt seams; enclosed seam trimmed, layered & clipped)  
d. facing invisible from right side  
e. facing tacked in proper places  

16. Hem. Consider the following:  
a. Depth (appropriate for style & fabric; even)  
b. appearance from right side (smooth, flat & inconspicuous)  
c. appropriate hem-finish  
d. stitching (appropriate type; neat & even)  
e. pressing
Garment Score

17. General appearance. Consider the following:
   a. evidence of logical order in steps of construction
   b. neatness
   c. overall pressing
   d. hang of garment
   e. bias and curved areas smooth & unstretched
   f. arrangement of plaid or other figured design
   g. arrangement of fabric, trim, design & color

If there are construction details on the garment being scored which are not listed above, please itemize these and give your evaluation of the quality of construction of these details using the scale as above.

Lining Score
APPENDIX H: COURSE EVALUATION QUESTIONNAIRE
Course Evaluation Questionnaire

Name ___________________________ ________________________ (First) (Middle)

This questionnaire is designed to give you an opportunity to indicate your reaction to clothing construction since you enrolled in this course.

Please respond to each of the three statements below by placing a number in the space after the statement which represents the extent of your agreement or disagreement with the statement. You may use any number from 1 to 9 according to the following scale. Use 1 to indicate complete disagreement, 5 to indicate neither agreement nor disagreement and 9 to indicate complete agreement. Use intervening numbers to indicate extent of agreement or disagreement.

Please record your response in the blank before each statement.

1. _____ From the standpoint of clothing construction this course was too easy for me.

2. _____ I learned a great deal from this course.

3. _____ I like sewing very much

4. If you continue to sew, why would you undertake garment construction? (Rank choices by number: 1 for first choice, 2 for second choice 3 for third choice and 4 for fourth choice.)

_____ for enjoyment

_____ for individual fashion

_____ for economy

_____ to earn money
The purpose of the remainder of this questionnaire is to ascertain the extent of difficulty you experienced with different aspects of the beginning clothing construction course. Aspects of clothing construction are listed on pages 3 and 4. Please indicate the extent of difficulty you had with each of these aspects by using the numbers 1 through 9 according to the following scale.

1 means that you are completely certain that it was easy.
Use numbers between 1 and 5 to indicate the extent to which you are certain it was easy.

5 means that you are uncertain whether it was easy or difficult.
Use numbers between 5 and 9 to indicate the extent to which you are certain it was difficult.

9 means that you are completely certain that it was difficult.

In the first space before each item place the number which best identifies the extent of ease or difficulty you experienced in learning the principle involved. In the second space place the number which best identifies the extent of ease or difficulty you experienced in applying the principle (that is, the actual procedure involved in the construction of a garment).

Please respond in the first and second spaces before each item.
### Comprehension of Principle

### Application of Principle

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1. choosing equipment</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2. taking body measurements</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3. checking pattern type and size</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4. choosing the pattern</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5. selecting correct yardage</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6. understanding the pattern</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7. altering the pattern</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>8. preparing the material before cutting</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9. placing the pattern on the fabric</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>10. pinning the pattern to the fabric</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>11. cutting out the garment pieces</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>12. marking the garment pieces</td>
<td></td>
</tr>
</tbody>
</table>

**I. Before construction of a garment:**

1. choosing equipment
2. taking body measurements
3. checking pattern type and size
4. choosing the pattern
5. selecting correct yardage
6. understanding the pattern
7. altering the pattern
8. preparing the material before cutting
9. placing the pattern on the fabric
10. pinning the pattern to the fabric
11. cutting out the garment pieces
12. marking the garment pieces

**II. During construction of a garment:**

1. developing desirable work habits
2. using the sewing machine
3. using fundamental hand stitches
4. making adjustments in garments
5. using proper techniques of pressing

**III. Construction of a garment:**

1. using staystitching
2. constructing darts
3. constructing seams
4. selecting appropriate seam finishes
5. using interfacing
6. using facings
7. using trimming and clipping techniques
8. using linings
9. making hand worked buttonholes
10. making bound buttonholes
11. applying collars
<table>
<thead>
<tr>
<th>Comprehension of Principle</th>
<th>Application of Principle</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>12. inserting sleeves</td>
</tr>
<tr>
<td>13</td>
<td>13. constructing hems</td>
</tr>
<tr>
<td>14</td>
<td>14. applying slide fasteners</td>
</tr>
<tr>
<td>15</td>
<td>15. selecting and applying other fasteners</td>
</tr>
</tbody>
</table>

What were the main reasons that some students in the course experienced difficulty with aspects of the course?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

What were the main reasons some aspects of the course were easy for some students?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
APPENDIX I: INSTRUMENT USED FOR OBTAINING JUDGES' RATINGS OF PREDICTORS AND CRITERIA
Instrument Used for Obtaining Judges' Ratings of Predictors and Criteria

To: Faculty of Textiles and Clothing at Iowa State University

From: Sister Irene Burge, graduate student at Iowa State University

You can help a great deal with my research project by completing this questionnaire. The purpose of the questionnaire is to obtain your judgment about the importance of 1) previous experience in clothing construction for predicting performance in a college elementary clothing construction course, 2) previous experience in certain manipulative skills for predicting performance in a college elementary clothing construction course, and 3) certain criteria for measuring performance in a college elementary clothing construction course.

Please respond to the statements of the questionnaire by indicating how certain you are about whether you agree or disagree with these statements. If you are certain you agree with the statement, decide how certain you are. If you are very certain write 99 in the blank beside the statement. If you are less certain use a number between 50 and 99. If you cannot decide whether you agree or disagree write 50 in the blank.

If you are certain that you disagree with the statement, decide how certain you are about this decision. If you are very certain that you disagree write 1 in the blank. If you are less certain that you disagree use a number between 1 and 50.

The following scale summarizes the directions given above and may help you to keep these directions in mind.

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<thead>
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<th>Agree</th>
</tr>
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<td>Certain</td>
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<td>that I</td>
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<tr>
<td>Disagree</td>
<td>agree</td>
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Very certain that I disagree
Statements pertaining to predictors

1. The number of garments a student made in the two years prior to enrollment in elementary clothing construction at the college level is a predictor of performance in the course.

2. The percentage of her own clothing that a student made prior to enrollment in elementary clothing construction at the college level is a predictor of performance in the course.

3. The amount of time spent in studying clothing construction at the junior and senior high school levels is a predictor of performance in elementary clothing construction at the college level.

4. The amount of time spent in a 4-H program prior to enrollment in elementary clothing construction at the college level is a predictor of performance in the course.

5. Learning clothing construction at home is a predictor of performance in college elementary clothing construction. (Student response was either YES or NO).

6. Learning clothing construction in a course presented by a sewing machine company is a predictor of performance in college elementary clothing construction.

7. Learning clothing construction from an experienced tailor is a predictor of performance in college elementary clothing construction.

8. Learning clothing construction from an experienced seamstress is a predictor of performance in college clothing construction.
9. The score on a paper-and-pencil clothing construction pre-test (similar to one used at Iowa State University) is a predictor of performance in college elementary clothing construction.

10. The number of years a student made her own clothes is a predictor of performance in college elementary clothing construction.

11. Previous experience with knitting is a predictor of performance in college elementary clothing construction. (Student response was either YES or NO).

12. Previous experience with crocheting is a predictor of performance in college elementary clothing construction. (Student response was YES or NO).

13. Previous experience with making doll clothes is a predictor of performance in college elementary clothing construction. (Student response was either YES or NO).

14. The number of years a student played piano or organ is a predictor of performance in college elementary clothing construction.

15. Typing speed, in number of words per minute, is a predictor of performance in college elementary clothing construction.

Statements pertaining to criteria

1. The score on a paper-and-pencil clothing construction test (similar to the I.S.U. test used for placement) administered at the completion of college elementary clothing construction is a measure of success in the course.
2. The identification of the degree to which the students found the clothing construction course difficult is a measure of success in the course. (Students responded to the statement "from the standpoint of clothing construction this course was too easy for me" by using a 9-point rating scale describing agreement or disagreement with the statement).

3. The identification of the degree of difficulty a student experienced in college elementary clothing construction in relation to 32 course objectives is a measure of success in the course.

4. The identification of the amount the student learned during the college elementary clothing construction course is a measure of success in the course. (Students responded to the statement "I learned a great deal from this course" by using a 9-point rating scale describing agreement or disagreement with the statement).

5. The identification of the degree to which the student found enjoyment in sewing is a measure of success in the course. (Students responded to the statement "I like sewing very much" by using a 9-point rating scale describing agreement or disagreement with the statement).

6. The mean score on garments constructed by a student during a college elementary clothing construction course is a measure of success in the course.

THANK YOU VERY MUCH FOR YOUR COOPERATION.
APPENDIX J: ADDITIONAL TABLES
Table 37
Results of Item Analysis of 52-item Pretest

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<th>Universities</th>
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<th>C</th>
<th>D</th>
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Number of test items

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<th>0.20-0.15</th>
<th>0.15-0.05</th>
<th>Less than 0.05</th>
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Difficulty index

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Distribution by Grade of Students Who Learned Clothing Construction in High School

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<th>A Unit</th>
<th>A Sem.</th>
<th>A Year</th>
<th>B Unit</th>
<th>B Sem.</th>
<th>B Year</th>
<th>C Unit</th>
<th>C Sem.</th>
<th>C Year</th>
<th>D Unit</th>
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**Totals**

| Grade 7 | 21 | 5 | 19 | 12 | 6 |
| Grade 8 | 33 | 8 | 29 | 13 | 4 |
| Grade 9 | 34 | 14 | 30 | 16 | 15 |
| Grade 10 | 22 | 11 | 20 | 9 | 18 |
| Grade 11 | 13 | 10 | 8 | 4 | 11 |
| Grade 12 | 12 | 6 | 5 | 2 | 9 |
Table 39
Number of Students in Each University Who Made Different Types of Garments in Different Fabrics

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<td>7</td>
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</tr>
<tr>
<td>Suits, lined</td>
<td>1</td>
<td>8</td>
<td></td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Suits, unlined</td>
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<td>Coat</td>
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<td>1</td>
<td>1</td>
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<tr>
<td>Other</td>
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<td>3</td>
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</table>
Table 40

Results of Item Analysis of 52-item Posttest

<table>
<thead>
<tr>
<th>Universities</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>0.64</td>
<td>0.54</td>
<td>0.48</td>
<td>0.68</td>
<td>0.51</td>
<td>0.59</td>
</tr>
<tr>
<td>Mean score</td>
<td>33.15</td>
<td>31.07</td>
<td>32.95</td>
<td>32.50</td>
<td>33.14</td>
<td>32.65</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>5.19</td>
<td>4.77</td>
<td>4.27</td>
<td>5.48</td>
<td>4.37</td>
<td>4.90</td>
</tr>
<tr>
<td>Number of test items</td>
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</tr>
<tr>
<td>Index of discrimination</td>
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<tr>
<td>Over 0.40</td>
<td>10</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>0.40-0.20</td>
<td>23</td>
<td>19</td>
<td>16</td>
<td>19</td>
<td>16</td>
<td>31</td>
</tr>
<tr>
<td>0.20-0.15</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>0.15-0.05</td>
<td>7</td>
<td>9</td>
<td>12</td>
<td>4</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>Less than 0.05</td>
<td>6</td>
<td>13</td>
<td>11</td>
<td>13</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Difficulty index</td>
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<tr>
<td>Over 70</td>
<td>22</td>
<td>16</td>
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<td>21</td>
<td>20</td>
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<tr>
<td>70-30</td>
<td>26</td>
<td>34</td>
<td>22</td>
<td>29</td>
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<td>2</td>
<td>6</td>
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</table>
Table 41
Judges' Ratings, Normal Deviates, and Mean Normal Deviates for Predictors

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Ratings</th>
<th>Normal deviates</th>
<th>Mean normal deviates</th>
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</thead>
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<td>Judges</td>
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<tr>
<td>1</td>
<td>90</td>
<td>128</td>
<td>84</td>
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<tr>
<td>2</td>
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<td>84</td>
<td>52</td>
</tr>
<tr>
<td>3</td>
<td>70</td>
<td>52</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>70</td>
<td>52</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
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<td>52</td>
<td>13</td>
</tr>
<tr>
<td>6</td>
<td>70</td>
<td>52</td>
<td>25</td>
</tr>
<tr>
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<td>60</td>
<td>25</td>
<td>13</td>
</tr>
<tr>
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<td>25</td>
<td>-67</td>
<td>-39</td>
</tr>
<tr>
<td>9</td>
<td>40</td>
<td>-25</td>
<td>13</td>
</tr>
<tr>
<td>10</td>
<td>40</td>
<td>-25</td>
<td>13</td>
</tr>
<tr>
<td>11</td>
<td>25</td>
<td>-67</td>
<td>-25</td>
</tr>
<tr>
<td>12</td>
<td>25</td>
<td>-67</td>
<td>0</td>
</tr>
</tbody>
</table>

^1, cognitive abilities in clothing construction as measured by pretest; 2, number of years education in clothing construction at high school; 3, number of years education in clothing construction in a 4-H program; 4, learned clothing construction at home; 5, number of garments made in two years prior to enrollment in elementary clothing course; 6, percentage of her own garments a student made in two years prior to enrollment; 7, number of years a student made her own clothes; 8, previous experience making doll clothes; 9, number of years experience playing piano and organ; 10, typing speed in words per minute; 11, previous experience with knitting; 12, previous experience with crocheting.
Table 42
Judges' Ratings, Normal Deviates, and Mean Normal Deviates for Criteria

<table>
<thead>
<tr>
<th>Criteria(^{a})</th>
<th>Ratings</th>
<th></th>
<th></th>
<th></th>
<th>Normal deviates</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Judges</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>Judges</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>90</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>128</td>
<td>84</td>
<td>84</td>
<td>84</td>
<td>95.0</td>
</tr>
<tr>
<td>2</td>
<td>75</td>
<td>70</td>
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<tr>
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<td>55</td>
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<td>0</td>
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<td>13</td>
<td>-128</td>
<td>-35.0</td>
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<tr>
<td>4</td>
<td>90</td>
<td>75</td>
<td>75</td>
<td>90</td>
<td>128</td>
<td>67</td>
<td>67</td>
<td>128</td>
<td>97.5</td>
</tr>
<tr>
<td>5</td>
<td>90</td>
<td>75</td>
<td>70</td>
<td>70</td>
<td>128</td>
<td>67</td>
<td>52</td>
<td>52</td>
<td>74.5</td>
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<tr>
<td>6</td>
<td>80</td>
<td>70</td>
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<td>75</td>
<td>84</td>
<td>52</td>
<td>104</td>
<td>67</td>
<td>76.7</td>
</tr>
</tbody>
</table>

\(^{a}\)1, cognitive ability in clothing construction as measured by posttest; 2, extent of difficulty experienced with 30 course objectives; 3, extent to which clothing construction was judged as too easy; 4, judged extent of learning of clothing construction experienced during the course; 5, extent of enjoyment of sewing; 6, performance in clothing construction as measured by garment scores.
Figure 18. Scattergram of difficulty indices for 89 items of the posttest for University A and five
Scattergram of difficulty indices for 89 items of the posttest for University A and five universities combined.
Figure 19. Scattergram of difficulty indices for 98 items of the posttest for University B and five universities combined.
Scattergram of difficulty indices for 98 items of the posttest for University B and five universities combined.
Figure 20. Scatterogram of difficulty indices for 98 items of the posttest for University C and five universities combined.
Scattergram of difficulty indices for 98 items of the posttest for University C and five universities combined.
Figure 21. Scattergram of difficulty indices for 98 items of the posttest for University D and five uni-
Scattergram of difficulty indices for 98 items of the posttest for University D and five universities combined.
Figure 22. Scattergram of difficulty indices for 96 items of the posttest for University E and five univ...
22. Scattergram of difficulty indices for 98 items of the posttest for University E and five universities combined.