A CURRICULUM PLAN FOR AN ADVANCED TEXTILES COURSE

By

Shirley A. Randall

A PROBLEM

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TABLE OF CONTENTS

CHAPTER		Page
I.	INTRODUCTION	
	Statement of the Problem	1
	Methodology	4
	Literature Review	5
II.	DEVELOPMENT OF THE COURSE	19
	Rationale	20
	Goals and Objectives	20
	Lecture and Laboratory Topics	22
III.	SUMMARY AND CONCLUSIONS	29
BIBLIOGRAPHY		31

CHAPTER I

INTRODUCTION

Statement of the Problem

Appointment to the home economics staff at Wisconsin State University, Stevens Point, Wisconsin, in the capacity of instructor in textiles provided the author with the incentive for this study. One of the responsibilities of this position is the development of a second term advanced textiles course to be offered for the first time the second semester of the 1968-69 school year.

Ideally a textile laboratory is designed after the objectives and purposes of student experiences have been clearly identified. However, in reality this is not the situation at Stevens Point. Extensive testing equipment for a textile laboratory was obtained under a government grant prior to the author's involvement.

The purpose of this problem is to develop a curriculum plan for an advanced course taking full advantage of the existing equipment and space.

The development of a curriculum for an advanced textiles course requires an understanding of the importance of textiles in today's society. Education serves as a basis for decision making by producing behavioral changes which help students

and families in making satisfactory choices. Our rapidly changing society requires individuals capable of making these decisions and the adjustments needed to live in such a society.

Inclusion of an advanced textiles course in the home economics curriculum at Wisconsin State University has justification. Textiles play a major role in making possible the patterns of living for today's families. Without the new fibers and minimum care fabrics which have been created as a result of textile knowledge, present patterns of living would be vastly different.

With the ever-increasing number of textile fibers which are used in fabrics for wearing apparel and household textiles, it is becoming more significant to have information on fibers in order to choose wisely from the many different fabrics available. Along with the beauty of textiles for clothing and surroundings, serviceability and suitability are factors to be considered. The values of all people are not identical. While some may select fabrics for beauty, others are concerned with durability and suitability. A knowledge of fabric structure and its relation to function enables more intelligent prediction of performance and selection for end use.

A major portion of the home economics students at Wisconsin State University are education majors and will probably teach

home economics. Although the home economics teacher will not present facts and concepts she has learned in college dealing with the properties of fibers to high school students, she must be more knowledgeable than the students. Without this knowledge the teacher would find it difficult to inspire students to learn and to think beyond the facts, formulas and routine procedures.

Teachers are expected not only to solve current problems but to foresee potential problems. Students must be taught to analyze, evaluate, interpret and apply knowledge to new situations and new products. As Whitehead emphasized long ago, education should aim at the effective utilization of knowledge (27).

While advanced textiles can be taught without the use of textile testing instruments, laboratory problems in textiles have advantages. Dale's Cone of Experience (9) shows that abstract understanding is based on personal experience. Although testing in the laboratory does not actually equate with end use, opportunity is provided to observe fabric deterioration and comparative properties of fabrics. Joseph (16) states "Standard test procedures used in the laboratory provide reliable data that may be used in evaluation and, in some instances, in prediction of fabric behavior . . . Test results do provide guidelines for evaluating textile performance and

as such serve as a valuable function in the classroom or laboratory."

We need to develop inquisitive students, young people who desire to find answers for themselves and to draw conclusions independent of their instructors. The future demands that we prepare new teachers who themselves have an intellectual curiosity and who thereby can stimulate their students to be likewise.

Methodology

In a separate problem, a detailed investigation of laboratory instruments was carried out and the information compiled in manual form. Letters were written to textile departments of twelve major universities to determine if any studies had been made on the problem of establishing textile laboratories. Negative responses prompted library research. The emphasis of this investigation was on standard test methods, applications and limitations for each instrument and test method, space requirements and procurement of additional accessories and supplies.

While the instrument investigation served as background, the focus of this study is on curriculum implications of developing a curriculum plan for an advanced textiles course.

Since this problem involved curriculum planning, the Home Economics Education staff was consulted regarding the

curriculum implications. The advisability of establishing a course rationale, formulating goals and objectives as well as defining the major concepts to be considered was suggested.

Justifications and descriptions of similar courses were examined before the development of the rationale for an advanced course.

Using the recommendations of educational authorities as a guideline, goals and objectives for an advanced textile course were formulated.

References provided background information necessary for understanding the concept approach and selecting appropriate concepts.

Simultaneously, laboratory manuals used in textile departments of other universities were reviewed and evaluated for appropriateness to the situation at Wisconsin State University. Books dealing with the subject of test methods were also investigated for pertinence.

Based on pertinent textbooks and laboratory manuals, a sequential outline of lecture topics and laboratory problems was also planned.

Literature Review

Through correspondence with the textile departments of leading universities, it was hoped to obtain a number

of laboratory manuals currently used in courses of a similar nature. Only six laboratory manuals for evaluation were available. Several respondents indicated that a manual was not in use. Three replies stated that a manual was not used, but the organization of the course and the approach to testing fabrics and garments was indicated. The remaining failed to respond.

Of the laboratory manuals received, three were planned for courses other than advanced textiles. One (39) was developed for use in beginning level textile courses. Two (36, 40) were judged as oriented to the retailing aspect of textiles and were not applicable.

A fourth manual (35) was developed for use in a textile chemistry course with much emphasis placed on chemical analysis. One manual (38) was found to consider textile analysis without a foundation in chemistry and lastly, another (37) was designed for students with and without this science background.

A survey of the laboratory manuals that were obtained revealed common laboratory experiences. All have tests designed to identify fibers either by burning tests, microscopic tests, solubility tests, or textile identification stains or by combinations of the various methods. Although adaptations were made, prescribed testing was based on ASTM

designations or AATCC methods. Each contains a section on stain removal. All have dimensional stability and colorfastness tests. Tests for thread count, twist and wrinkle recovery were also included in each manual. Where instruments were not available, manuals suggested simple testing with a minimum amount of control.

The approach to testing varied with the chemistry background of the students for which the manual was planned. Emphasis of dyestuffs and color methods and tests for the same, seemed to vary directly with the amount of chemistry involved in other testing. Some manuals included testing that others did not. Presumably the manuals are based on the available equipment in each of the laboratories. Some manuals specified that testing was to be done on one fabric, giving the student an opportunity to observe property relationships; others specified a comparison of two similar fabrics with only one variable to illustrate the effect of the variable on the performance of a fabric. From this review of manuals, it would seem that no one manual is usable for the laboratory at Wisconsin State University. Adaptations are necessary. In addition to content consideration, the length of the term or semester varies with the institution; therefore, the time element is a determinant of the amount of subject matter and testing which can be covered.

Books dealing with test methods seem to be very limited. Booth (5) directs his discussion of the principles of textile testing to technologists engaged principally in the production and distribution of textile products. Strong emphasis is placed on the statistical element and the selection of samples for testing. Booth suggests that the book not be read in isolation but in conjunction with the British Standards Handbook No. 11, Methods of Test for Textiles, which is the British counterpart of ASTM Standards. Of a highly technical nature is Garner's Textile Laboratory Manual (12), a six-volume work closely associated with Booth's Principles of Textile Testing. Meredith and Hearle (22) attempt to apply scientific research in experimental physics to textile technology. This book is a result of a series of lectures delivered at the Manchester College of Science and Technology in 1956 and 1967. Many of the details and illustrations have been taken from the British Standards Handbook and A.S.T. M. Standards on Textile Materials. While some of the material covered in Skinkle (24) is applicable, a portion is out-of-date and incomplete. The most widely accepted and recognized source for information on test methods, both nationally and internationally, appears to be A.S.T.M. Standards - Part 24 - Textile Materials published by American Society for Testing and Materials (2). Of comparative value is the Technical Manual of the American Association of Textile Chemists and

Colorists (1). Reasons for wide acceptance and recognition are that the methods designated by both associations are standardized, the tests give accurate results, and the methods suggested are easily duplicated. For general laboratory use, the American Standard Performance Requirements for Textile Fabrics published by American Standards Association (3) and the Federal Specifications-Textile Test Methods (11) would be of value. Available also are numerous current periodicals which provide outside references.

Most educational authorities agree that the establish- of a sound rationale and meaningful goals and objectives are a necessary part of curriculum planning to increase assurance that more effective learning will take place.

Current educational literature offers numerous suggestions for the formulation of objectives. According to Tyler (26) the most useful form for stating objectives is to express them in terms of desired behavior in the student and the content area in which this behavior will operate. Mager (20) states that objectives are measurable otherwise it is impossible to determine whether or not the program is meeting objectives. Furthermore, Shear (34) emphasizes that it is not the task of any one college of home economics or any university to teach all things to all students. The job of college faculty engaged in curriculum planning is to select appropriate objectives in a rational manner from a multitude of possible objectives. These objectives should be consistent with the overall college

purposes as well as the purpose of the university. The objectives should also consider the students and their capabilities and needs.

Authorities on curriculum development stress the importance of identifying concepts in relation to the subject matter covered by any course. The significance of the concept approach to teaching is indicated by outstanding educators. Dr. Tyler has said, "The study of concepts, skills and values is an effective way of organizing and analyzing a curriculum" (26). In Dr. Bruner's book, "The Process of Education," this statement appears, "The curriculum of any subject at any level should be determined by the most fundamental understanding that can be achieved of the underlying concepts and principles that give structure to that field (6). Dressel (30), French Lick Seminar Consultant, expressed the same idea, "The power of a field depends on its having a clear definition of the fundamental concepts in that field - this avoids rationalization without adequate basis." Burton and others conclude that "concepts give us a relatively stable, relatively permanent system of knowledge subject to change as new facts are discovered and enable us to generalize, to carry understanding quickly from one thing to another, and to supplement our knowledge of any specific thing by drawing on the total connotation of the concept" (7). In essence, concept teaching is believed to facilitate transfer of learning and provide a frame of reference for evaluating future experience.

Concepts have been defined in many ways. The terms concept, generalization and understanding are used in a number of ways and to some they are interchangeable and to others each has a distinctive meaning. Lee and Lee (19) refer to concepts as learning in a functioning form, or usable knowledge differing significantly from facts or skills although both are incorporated. In other words, the essential factor is one of relationship and interrelationship. While the emphasis on the conceptual approach is comparatively recent, in 1906, Keith (17) wrote, "Concepts are the mind's way of thinking the many into one...a way of finding unity in variety." McClelland (21) defined concepts as abstractions that can be used to organize thinking and facilitate communications. Harré (14) defined concepts as the vehicles of thought. Archer (4) indicated that a concept is the label of a set of things that have something in common. Rhodes (32) states that "a concept deals with the meaning an individual attaches to a word or phrase." To some authors, including Woodruff (29), ideas of any complexity may be regarded as concepts. Concepts, according to Bruner (6), delineate the basic principles or fundamentals which make a subject comprehensible. Dressel (30) identifies seven types of concepts: ideas, rules, generalizations, principles or laws, theories, problems and areas of living and then goes on to suggest that the first of these is the concept in pure form whereas the remaining requires a statement of relationship among concepts.

Three levels of concepts are identified by Burton (7). Knowledge, definitions, descriptions, analogy, identification, and classification are included in the first level. The second level shows relationships and the third explains, interprets, justifies and predicts.

At the French Lick Seminar, Dr. Dressel provided criteria (30) for the selection of concepts. The following qualities were stressed:

1) Important, central, key.
2) Transmittable through planned educational experiences.
3) Based on or related to research.
4) Useful in stimulating search for meaning and in encouraging further investigation.
5) Useful in interrelating facts and lower level concepts.
6) Useful in decision making.
7) Directive, cumulative, and integrative.

Several conceptual approaches to subject matter for advanced textiles were reviewed. Based on background readings, the concepts and generalizations selected for the advanced textiles course are those developed at the 1966 Seminar on Concepts which was sponsored by the Central Region of College Teachers of Clothing and Textiles (31). Only those concepts and generalizations which were felt to be appropriate for the advanced textile course were selected.

CONCEPTS BASIC TO TEXTILES (31)

I. FUNCTIONS OF TEXTILES - (Consumer Oriented)

A. Aesthetic Functions

1. Fabric design can be attained by color, finish or yarn and/or fabric structure.
   a. Color acceptance of fiber is dependent upon chemical structure of the fiber, chemical structure of dye, and the type of attractive forces between the two.
   b. Visual and tactile textures are produced by fabrication and finishing processes. Variations in fabric appearance, weight, shape retention, hand, and drapeability are desirable for the numerous end uses for textiles. These variations are achieved by the proper selection of fiber type, yarn and fabric structure and finish.

B. Comfort

Comfortable clothing can be worn without its intruding on the conscious thought of the wearer. Factors which influence this are thermal qualities, weight, elongation (stretch) and recovery, resilience, hand and opacity.

C. Performance in Service

1. In order for fabrics to retain their original appearance throughout the desired wear-life, the following properties are desirable: color retention; muss and pill resistance; and elastic characteristics.
2. The ability of a fabric to retain its shape during use is dependent upon such properties as dimensional stability, elastic recovery and resilience.
3. Ease of care (cleanability with minimum amount of pressing) is dependent upon fiber properties, fabric construction, and finishes applied as well as techniques of care.
4. When the wear-life of the fabric is important, the durability of that fabric is dependent upon such factors as surface contours, abrasion resistance and elastic properties.
5. By the proper selection of fibers, yarns, fabrics and finishes, fabrics are produced which protect the individual from the rain, cold, heat, germs, insects and injury.
6. Functional finishes protect fabric against degradation from such factors as light, mildew, rot, heat and insects.

II. FABRICATION OF TEXTILES - (professionally Oriented)

The properties of the finished textile product are determined by fiber properties, yarn and fabric structure,

coloring methods and finishing processes.

A. Fibers

1. Legislation has divided these fibers into generic classes according to chemical composition. Fibers within a generic group tend to have similar, although not identical, properties.
2. Such properties as fiber length, cross-sectional shape, and cohesiveness affect the types of yarn structures which can be made from fibers.
3. The length to mass ratio of a fiber (or yarn) is termed its linear density. Methods of expression for this value include tex, denier or count. As the linear density of a fiber increases, its stiffness also increases.
4. The chemical properties such as resistance to acids, bases, solvents, bleaches, insects, mildew, and light are directly dependent upon the chemical composition of the fiber. These properties may be important for specific uses and are important in the development of proper methods of care, cleaning and stain removal.
5. The physical properties such as strength, elongation, elastic recovery, resilience, abrasion resistance, pilling and dimensional stability are related to the molecular arrangement within its fibers.
6. Such properties as heat sensitivity and moisture and dye absorption are dependent upon both the chemical composition of the fiber and the molecular arrangement within the fiber.
7. The luster of man-made fibers can be varied by the inclusion of delustering agents. The presence of these delustering agents often reduces light resistance.
8. Textile fibers are composed of long chain (polymer) molecules which are placed together in varying types of molecular arrangements such as amorphous, oriented or crystalline. All fibers contain varying amounts of these three types of arrangements.
   a. Molecules having flexible chain structures, curled or coiled chain conformations, and many large or irregularly substituted side groups will tend to form amorphous (chaotic) arrangements.
   b. Molecules can be oriented (aligned along the long fiber axis) either by the natural forces of fiber production as in linen or by drawing as in man-made fibers.
   c. Molecules having rigid chain structures, extended chain conformations, and many regularly substituted polar groups will tend to form crystalline arrangements.

9. Fibers having predominantly amorphous arrangements tend to be weak, pliable, and have high elongations. They may also have higher moisture and dye absorption than oriented and/or crystalline structures of the same general type.
10. Fibers having predominantly oriented but not crystalline structures tend to be strong, moderately pliable and have moderate elongations. They are often highly abrasive resistant.
11. Fibers having predominantly crystalline structures tend to be stiff and brittle and to have low elongations and flex abrasion resistance. They will be strong fibers if the crystallites are oriented.
12. Elastic properties in fibers can be obtained by:
    a. Bonding molecules in the transverse directions with either covalent crosslinks or many associative bonds as in crystallites.
    b. Using molecules which prefer a curled or disordered arrangement and which can not form strong associative bonds between themselves in the stretched state.

B. Yarn
1. Yarn construction variations are dependent upon the degree of parallelization of fibers, ply, type and length of fiber, degree and direction of twist, and diameter of yarn.
    a. Fabrics constructed of spun yarns are less smooth than the fabrics constructed of filament yarns. Fiber properties are translated more directly into yarn and fabric properties when filament yarns are used than when spun yarns are used.
    b. Fabrics constructed of yarns with greater parallelization are smooth and more lustrous than are fabrics made from yarns that are less parallel.
    c. The complexity of yarns varies as to the number of components (single, ply or cord) and the degree of similarity of the components (simple or complex) to each other.
        1) Textured and/or stretch yarns (filament yarns which have been given a coil, crimp or loop) have greater bulk, stretch or modified stretch, than do comparable unprocessed yarns.
        2) The durability of fancy yarns in fabrics depends upon the type of yarn used, the size of yarn, and the degree of twist. The firmness with which core and effect yarns are held together and the firmness of the fabric weave affect durability.

3) Complex yarns contribute to fabric texture, design, and wearing comfort through variations in surface effects, thermal qualities, weight, elongation (stretch) and recovery.

d. As the degree of twist of yarn is increased, the yarn becomes harder, luster decreases, strength increases up to a point of twist, and the yarn becomes shorter in length. The degree of twist also influences the surface appearance and dimensional stability of the resultant fabric.

C. Fabrics

1. The performance of a fabric is dependent upon the fiber properties; fiber mobility within the yarn; diameter of the yarns; yarn twist, crimp, and type; thread count; the number and regularity of yarn interlacements; and the resultant yarn mobility within the fabric. Finishes applied to the fabric can alter this performance. Fabric properties which affect the performance in use are durability (strength, elongation, and abrasion resistance), weight, thickness, stiffness, resilience and related elastic properties and dimensional stability.

a. The durability of a fabric is dependent upon its ability to absorb stress and recover from it. Fabrics having high strengths, elongations and elastic properties will also tend to have high abrasion resistance and durability. Smooth surfaced fabrics have higher flat abrasion resistance than do rough surfaced ones.

1) The strength of a fabric is dependent upon the fiber strength, yarn type (staple or filament), linear density of the yarns and thread count.

2) The fabric elongation is derived from the removal of yarn crimp, slippage of fibers within the yarns, and the elongation of the fiber.

b. The weight of a fabric is determined by the linear density of the yarns used and the thread count. The fabric weight has a marked effect on such properties as strength, thickness, stiffness, flat abrasion resistance and warmth.

c. The stiffness of a fabric is dependent upon the yarn crimp, length of yarn crossover, number of yarn interlacements, yarn size and twist and the fabric weight.

d. The resilience and related elastic properties of a fabric are dependent on the elastic properties of the fiber, fiber mobility within the yarn, yarn mobility within the fabric, and the diameter of the yarn.
e. The dimensional stability of a fabric is related to the fiber stability, the deformations caused by the tensions applied during fabric construction and finishing, and the degree of recovery from these deformations during subsequent finishing operations.

D. Dyeing and Printing
1. Dyeing and printing are finishing processes used to enhance the appearance of the fabric. The type of dye depends upon fiber and the intended use of the fabric.
a. Satisfaction with the finished goods is affected by the permanency of the dye. Permanency depends upon:
1) Environmental conditions. High humidity and high sunlight intensity decreases color permanency of many dyes. The nitrogen oxides in the atmosphere often cause fume fading of some dyes applied to acetate, nylon and polyester fibers.
2) The severity of treatment in use and care.
3) Type of dye. Dyes which are insoluble in water or other cleaning agents or which form covalent bonds with the fiber are more colorfast than other types.
4) Coloring method.
a). Dyeing. Dyes are applied at the various stages of fiber, yarn and fabric production. Pigments added to the spinning solution of man-made fibers produce a colorfast dyeing which is evenly distributed throughout the fiber. Fibers, yarns or fabrics can be dyed by immersion.
b). Printing. Dyes can be applied to fabric surfaces by various methods of printing such as roller, screen, block, warp and resist. The majority of printed fabrics are produced by the roller or screen methods. Dyes applied to the surface of a fabric penetrate to the yarn and fiber interior less than those applied by immersion.

E. Finishes

1. Finishes are any processes performed on a fiber, yarn, or fabric before or after fabrication. One group of finishes is used to supply aesthetic appeal of appearance, drape, handle and texture. A second group of finishes includes special service features which are reasonably permanent or readily renewable. Among the more important are preshrinking and making fabrics fire retardant, insect resistant, mildew resistant, water repellent and capable of retaining a crease while resisting mussing or wrinkling. Three major classifications of finishes are mechanical, chemical and additive.

   a. Mechanical finishes cause only a physical change to fiber, yarn and fabric contour. Common mechanical finishes include beetling, brushing, calendering, compaction, embossing, fulling, napping, singeing and shearing.

   b. Chemical finishes cause a modification or change in the form or structure of a fiber, yarn and/or fabric.

      1) Additive finishes include flocking, sizing and weighting.

      2) Protective finishes guard against climatic conditions, flame, germs, insects, mildew, rot, scorch, staining and water.

      3) Properties and finishes produced by modifications of chemical structure of the fiber include dimensional stability, embossing, mercerization, static control, wrinkle resistance and stiffness.

CHAPTER II

DEVELOPMENT OF THE COURSE

In the development of an advanced textiles course for the home economics curriculum at Wisconsin State University, the needs of the students and the goals of the university were considered. One of the purposes of the home economics department at Wisconsin State University is the education of students, most of whom will become home economics teachers. Because the concept approach to teaching is believed to be more effective, course content was developed to teach concepts.

Another consideration was that relationships between fabric components, function and performance of fabrics in end use requirements should be taught after students have the basic information of the beginning course. Since textiles is a rapidly growing body of knowledge, students must be able to analyze and apply the information in new situations.

Lectures on fabric components, property relationships and current developments were designed to acquaint the student with material necessary for textile evaluation. Laboratory problems have been selected to reinforce the lectures and assist the student to analyze and relate testing data to performance of fabrics.

Rationale

In today's rapidly changing society adaptation is necessary. Since textiles is a dynamic area students must be taught to relate knowledge to new situations. In order that others might be taught to adapt, teachers must be aware of and understand these changes through meaningful experiences. To teach generalization and abstraction, increasing amounts of concrete materials at the interest level of the student must be utilized. Dale (9) states, "We can move to the abstraction only through the concrete." As a result of concrete experiences, the teacher is better prepared to develop the desired behavioral changes necessary for adaptation.

Ideally the teacher's range of experience is broader than that of the student. The development of an advanced textiles course which will expand knowledge and afford opportunities to think, investigate independently and experience should attain this ideal condition and enable application and transmission of the thought process.

Goals and Objectives

Based on the rationale of the advanced textile course, goals and objectives were written. Actually the purposes are essentially the same in both goals and objectives; however, goals refer to the teacher's desired outcomes in a more abstract manner. Objectives are measurable and are stated in terms of student behavior. The objectives were developed as a means of

measuring the teacher's goals for the students as well as student attainment.

Generally, the goals and objectives offer a breadth of experiences on which the student can base decision. Specific goals were selected to include information necessary for the relationship of fabric properties and the evaluation of products, data and pertinent literature.

The teacher's goals for the student include the ability of the student to attain certain results; therefore, they may be stated in terms of desired student behavior.

The student should:

1) Formulate basic concepts to evaluate new developments in textile technology for end use.

2) Become familiar with and be able to evaluate sources of information pertaining to textile testing and evaluation.

3) Gain a knowledge of selected standard test procedures and be able to interpret and apply results as related to performance.

4) Understand how physical and chemical properties of fibers are related to fabric performance.

5) Develop an awareness of the interrelationship of yarn and fabric structure, finishes, and color and design methods.

6) Recognize the advantages and limitations of laboratory testing.

The measurable objectives of the course stated in terms of student behavior are as follows:

1) Relate fabric geometry to textile concepts for given textile products.

2) Survey reliable sources of information on textile testing through library research and classify material as to consumer or research orientation.

3) Identify or verify fiber content by burning and solvency tests, microscopic identification and identification stains.

4) Utilize selected standard test methods and laboratory instruments for comparative studies of fabrics, fibers, weaves and finishes.

5) Report testing data in a well organized manner given the basic procedures for selected instruments.

6) Recognize and explain possible correlation between results and the performance of a fabric or fabrics based on testing data.

7) Determine and compare physical and chemical properties of selected fibers and fabrics.

8) Use and interpret scientific data as reported in current literature for the selection, use and care of textiles.

9) Predict with reasonable accuracy the performance and care requirements of given textile products based on the fabric components.

Lecture and Laboratory Topics

A sequential outline of lecture topics and laboratory experiences based on the goals and objectives for the course and the concepts selected is necessary for the organization of subject matter and supportive use of the laboratory equipment. An outline developed by the author meeting these requirements appears on page 25. The outline developed does not attempt to teach concepts individually in isolated

lecture topics as the properties, functions and performance are so interrelated. The concepts and course goals contain interrelated and overlapping subject matter; therefore, the course was organized according to subject matter rather than concepts. Each lecture topic is taught to include those concepts and goals which relate to it.

To illustrate the relationship of lecture topics and laboratory experiences of the course outline to each other and to the goals, objectives and concepts, a two-dimensional chart was prepared (pages 26-28). Each lecture topic and laboratory problem is charted separately. First looking at the specific lecture topic or laboratory problem and then at the columns with goals, objectives and concepts, the relationship can be observed.

Outside readings to attain the desired behavior of goal 2 and objectives 2 and 8, will be assigned when the author has had an opportunity to survey the library at Wisconsin State University. Oral and written reports were included to provide experiences for the attainment of goals 3 and objectives 6 and 8.

In addition, the outline for the beginning textiles course now being offered at Wisconsin State University indicates that only one or two lectures are devoted to yarns and fabric structures. The second course is planned to begin with a review of fibers and then go into more depth for yarns

and fabric structures. The beginning course outline also seems to indicate strong emphasis on individual fibers; therefore, the advanced course was planned to concentrate on structural modifications and relationships between fabrics, properties and function. Where necessary, lectures were planned to precede the corresponding laboratory problem. Examples of this are the property review, instrument test methods and stain removal lectures.

ADVANCED TEXTILES LECTURES AND LABORATORIES

WEEK	LECTURE TOPICS	LABORATORIES
1	INTRODUCTION FIBER CLASSIFICATION REVIEW	FIBER IDENTIFICATION Microscopic & Burning
2	PHYSICAL PROPERTIES OF FIBERS CHEMICAL PROPERTIES OF FIBERS	FIBER IDENTIFICATION Solubility & T.I.S.
3	FIBER MODIFICATIONS & BLENDS TEST METHODS	FIBER IDENTIFICATION OF UNKNOWN SAMPLES
4	TEST METHODS YARN STRUCTURES	INSTRUMENT DEMONSTRATION
5	COMPLEX & TEXTURED YARNS NEW DEVELOPMENTS	YARN COUNT, TWIST & NUMBER
6	EXAM STRUCTURAL DEVELOPMENTS	*MOISTURE CONTENT
7	MODIFICATIONS OF FABRICS MODIFICATIONS CONTINUED	TENSILE STRENGTH
8	ROUTINE & SPECIAL FINISHES NEW DEVELOPMENTS IN FINISHES	ABRASION RESISTANCE
9	DYESTUFFS APPLIED DESIGN	DIMENSIONAL STABILITY
10	COLORFASTNESS COLORFASTNESS	WRINKLE RECOVERY
11	DURABILITY DURABILITY	COLORFASTNESS Light and Crocking
12	EXTENSIBILITY ELASTICITY	COLORFASTNESS Laundry,Bleach & Persp.
13	EXAM DIMENSIONAL STABILITY	CONCLUSION OF TESTING
14	DIMENSIONAL STABILITY STAIN REMOVAL	STAIN REMOVAL
15	COMFORT COMFORT	ORAL REPORTS ON FABRIC EVALUATION PROBLEMS
16	CARE CARE PRODUCTS	ORAL REPORTS ON FABRIC EVALUATION PROBLEMS

EXAM (FINAL)

TEXT FOR COURSE: Joseph, Marjory L. Introductory Textile Science. New York: Holt, Rinehart and Winston, Inc., 1966.

* Laboratories 6 through 13 involve testing on rotating basis

RELATIONSHIP OF GOALS, OBJECTIVES AND CONCEPTS TO COURSE CONTENT

COURSE CONTENT	GOALS*	OBJECTIVES*	CONCEPTS**
Lecture Topics			
Fiber Classification Review	1		IIA1
Physical Properties of Fibers	1,4	1,3,7	IC3,IC4,IC5, II,IIA1,IIA2, IIA3,IIA5, IIA6,IIA8, IIB1a,IIC1, IIC1b,IIC1d.
Chemical Properties of Fibers	1,4	1,3,7	IA1,IC3,IC4, IC5,II,IIA1, IIA2,IIA4, IIA6,IIA8,IIA9, IIA12a,IIA12b, IIC1,IIC1d.
Fiber Modifications and Blends	1,5	1,3,7,9	IA1b,IIC1d.
Test Methods	1,3,6	2,4,5,6	
Yarn Structures	1,5	1,7,9,	IA1b,IC4,II, IIA2,IIB1, IIB1b,IIB1c, IIB1c1)2)3), IIB1d,IIC1a1), IIC1a2),IIC1c.
Complex and Textured Yarns	1,5	1,7,9	IA1b,IC4,II, IIB1,IIB1b,IIB1c, IIB1c1)2)3).
New Developments-Yarns	1,5	1,7	IA1b,IIB1b,IIB1c, IIB1c1)2)3).
Structural Developments & Modifications of Fabric	1,5	1,7,9	IA1b,IC3,IC4,II, IIC1c,IIC1e.
Routine & Special Finishes	1,5	1,7,9	IC3,IC5,IC6,II, IIA7,IIC1,IIE1, IIE1a,IIE1b, IIE1b1),IIE1b2), IIE1b3).

* Numbers refer to goals and objectives on pp. 21-22.
** Numbers and letters refer to concepts on pp. 13-18.

RELATIONSHIP OF GOALS, OBJECTIVES AND CONCEPTS TO COURSE CONTENT

COURSE CONTENT	GOALS*	OBJECTIVES*	CONCEPTS**
Lecture Topics (continued)			
New Developments in Finishes	1,5	1,7	IC3,IC5,IC6,II IIC1.
Dyestuffs - Color	1,5	1	IA1a,II,IIA6, IIA7,IIA9,IID1a, IID1a4)a), IID1a4)b).
Applied Design	1,5	1,7	IA1a,II,IIA7, IIB1C3,IID1a.
Colorfastness	1,5	1,6,7	IA1a,IC1,II, IID1a,IID1a1), IID1a3).
Durability	1,3,4,5	1,6	IC1,IC4,IIA9, IIA10,IIA11, IIB1c2),IIC1a, IIC1a1).
Extensibility	1,3,4,5	1,6	IC1,IC2,IIA9, IIB1c1),IIC1a, IIC1a2).
Elasticity	1,3,4,5	1,6	IC1,IC2,IC4, IIA10,IIA11, IIA12a,IIC1d.
Dimensional Stability	1,3,4,5	1,6	IC2,IIA5,IIB1d, IIC1e.
Stain Removal	1	9	IIA4.
Comfort	1,3,4,5	1,6	IB,IC5,IIA3, IIA9,IIC1c.
Care and Care Products	1,3,4,5	1,6,9	IC3,IC4,IIA4, IIA6,IIC1a, IIC1a1),IID1a2).
Laboratory Experiences			
Fiber Identification		3	IIA4.
Instrument Demonstration	3,6	4,5,7	

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RELATIONSHIP OF GOALS, OBJECTIVES AND CONCEPTS TO COURSE CONTENT

COURSE CONTENT	GOALS*	OBJECTIVES*	CONCEPTS**
Laboratory Experiences (continued)			
Yarn, Count, Twist and Number	3,6	4,5,7	IA1b, II, IIB1, IIB1a, IIB1b, IIB1c, IIB1d, IIC1 IIC1d, IIE1b.
Moisture Content	3,6	4,5,7	IC3, IIC1.
Tensile Strength	3,6	4,5,7	IIA5, IIA9, IC4, IIA10, IIA11, IIC1, IIC1a, IIC1a1).
Abrasion Resistance	3,6	4,5,7	IC4, IIA5, IIA9, IIA10, IIA11, IIC1, IIC1a.
Dimensional Stability	3,6	4,5,7	IC2, IIA5, IIB1d, IIC1, IIC1e, IIE1.
Wrinkle Recovery	3,6	4,5,7	IIB, IIC1.
Colorfastness	3,6	4,5,7	IA1c, IC1, IID1a.
Stain Removal	3,6	4,5,7	IC3, IIA4, IID1a, IID1a2).
Oral Reports on Fabric Evaluation	3,6	5,6,8,9	All concepts
Outside Readings	2	2,8	All concepts
Written Reports		5,6,9	

* Numbers refer to goals and objectives on pp. 21-22.
** Numbers and letters refer to concepts on pp. 13-18.

CHAPTER III

SUMMARY AND CONCLUSIONS

A course for advanced textiles should be of general value to others involved in curriculum development and instruction in the field of textiles. Anyone working with curriculum development must go through similar procedures.

Limited publications are available dealing with planning curriculums for instruction in this particular area. Some of the pertinent materials have been mentioned in the literature review and the bibliography could serve as a foundation for further study.

The value of this investigation to the author cannot be questioned. Since the course in advanced textiles is being offered for the first time at Wisconsin State University, no curriculum materials have been developed. The task of setting up this course has been partially accomplished through this study. A philosophical base and rationale for teaching advanced textiles has evolved. Through literature review, a basis has been provided for the establishment of goals and objectives. A means for eliminating irrelevant materials and relating subject matter to problem solving has come about through the process of selecting basic concepts. Course content has been clarified and organized in the course outline. The chart illustrating the relationship of goals, objectives and concepts to course content was especially helpful in the

clarification of the author's thinking and should prove equally valuable in the detailed preparation of lecture topics and laboratory problems.

While much of the task of developing a curriculum plan for advanced textiles has been accomplished, additional work remains to be done. Reading assignments and outside references will be planned when the library at Wisconsin State University has been surveyed for pertinent materials. As the physical arrangement of the laboratory is completed, changes may be necessary to facilitate testing. Means of evaluating the goals and objectives of the course will have to be developed.

Finally, after the course has been taught, the author realizes and expects that some additional changes will be made to meet the needs of the students.

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