This is to certify that the

thesis entitled

USE AND CONTROL OF MATERIALS: A FOODSERVICE LEARNING UNIT FOR POST-SECONDARY EDUCATIONAL INSTITUTIONS

presented by

Pauline W. Buchanan

has been accepted towards fulfillment
of the requirements for

M.S. degree in Institution Administration

Grace A. Miller

Major professor

Date September 19, 1980

O-7639

USE AND CONTROL OF MATERIALS: A FOODSERVICE LEARNING UNIT FOR POST-SECONDARY EDUCATIONAL INSTITUTIONS

By

Pauline W. Buchanan

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE

Department of Food Science and Human Nutrition

1980

ABSTRACT

USE AND CONTROL OF MATERIALS: A FOODSERVICE LEARNING UNIT FOR POST-SECONDARY EDUCATIONAL INSTITUTIONS

By

Pauline W. Buchanan

This investigation developed and tested a competency-based learning unit with eight beginning-level skill performance subsets and appropriate instructional materials that allowed practical application of foodservice management theories and methods. Subsets focused on the use and control of foods and materials in quantity foodservice operations and addressed, in part, competency statement #306 "Manage a system of cost control" proposed by Howard and Schiller (1). Types of performance activities used to assess student achievement included out-of-class assignments, on-campus laboratory exercises, off-campus field site reports and post-test questions. Subset and unit effectiveness was determined by the percentage of students who demonstrated 80%+ proficiency in meeting the expected performance standard. Scores were also examined to ascertain possible influences of career interest preference, academic major enrollment, and foodservice work experience. Class achievement means for all performance activities exceeded the 80% proficiency standard; 93% of the test sample (25 students) attained 80%+ overall unit mean scores.

---

[1]V. A. Howard and S. R. Schiller, "Competency-Based Education in a Career Mobility Program in Dietetics," J. Am. Dietet. A. 71:428, 1977.

ACKNOWLEDGMENTS

The author wishes to extend sincere appreciation to Dr. Grace A. Miller for her unending support, guidance, and council throughout the author's graduate program.

Sincere thanks are also given to Jim, J.D., and Carlye Buchanan for their encouragement, understanding, and toleration throughout the duration of this research.

* * * * *

TABLE OF CONTENTS

APPENDIX Page

LIST OF TABLES

CHAPTER I

INTRODUCTION

During the 1970's the concept of competency-based education has been adopted and emphasized at nearly all levels of education, including the post-secondary school areas. State departments of education are establishing competency criteria for secondary school vocational subjects. Post-secondary educational institutions are applying the educational model in the development of academic curricula for professional training programs. Many professional organizations have established or are currently in the process of developing competency standards for members in an effort to standardize evaluation criteria for membership and maintain professional quality assurance. There is increasing consensus among educators that the use of competency-based educational programs can alleviate some of the qualitative differences found among program graduates whether at the high school level, junior college level, or four-year college level.

In the profession of dietetics, the American Dietetic Association (ADA), as the official accrediting body, attempts to standardize the curricular content of two- and four-year dietetic study programs in post-secondary educational institutions. Despite this effort, internship directors, traineeship directors, and employers report considerable variance among dietetic graduates with respect to degree

of entry-level competence and technical skills (2). This demonstrates two basic needs in present college and university undergraduate study programs in dietetics:

- to better integrate information learned in the classroom with on-the-job application in the business world, and
- to develop standardized instructional-learning units in an effort to attain minimum acceptable quality outcomes for all dietetic students.

Howard and Schiller (14) have defined "competency" as the minimum knowledge, skills, affective behavior and/or judgment deemed essential for a professional person. The first step in educating any competent professional is to define clearly and specifically the roles and tasks to be mastered by the student. A student's competency is then evaluated against a specific set of criteria and an expected level of performance of the behavior stated in the objectives. In competency-based programs or courses, students are not graded on how their performance compares with that of another, but on how well they measure up to the expected standard.

Once competency-based curricula content can be identified, the next logical step is to attempt to standardize the essential learning experiences provided within each program of courses. The quality of most educational programs is dependent on the strengths and experiences of the instructional staff members. If meaningful learning units and laboratory exercises based upon pre-determined essential competencies can be developed, instructors with varied backgrounds can use the

instructional materials as guides and/or exercises to develop expected student competency levels.

The purpose of this research project was to develop a competency-based learning unit with eight skill performance subsets and appropriate instructional materials based on a selected general management competency that would allow practical application of food-service management theories and methods learned in the classroom in simulated and/or in real quantity foodservice settings. The development of the instructional unit was viewed as a pilot study to determine the effectiveness of this instructional-learning method for the beginning level college or university student in foodservice management and/or dietetics. The focus of the unit was on the use and control of foods and materials in a quantity foodservice setting and addressed, in part, competency statement #306, "Manage a system of cost control," as given by Howard and Schiller (14).

This experimental instructional-learning unit was tested in a portion of an established seven credit beginning level course in foodservice management, Food Systems Management I, at Mercy College of Detroit, Detroit, Michigan, Winter Semester, 1980.

CHAPTER II

REVIEW OF LITERATURE

Competency-Based Education

Competency-based education (CBE) is a tool that may be useful in the development of a more realistic, valid, and reliable educational program (12). Professions such as medicine, nursing, and teacher education have been proponents of a competency-based approach to formal instruction for many years. These fields of study are practice or service-oriented professions and include segments devoted to student demonstration of technical skills in realistic settings such as internship, supervised clinical practice, and student teaching. Areas of study included in vocational education programs such as distributive education and agriculture, have also experienced competency-based education as a viable part of their curriculum model.

Wenberg et al. (33) cited statements by Tyler (31) and Kaufman (17) that reported an effort in recent years to direct educators of professionals toward using a competency-based model of instruction, or competency-based education. Wenberg also reported research by Block (7) on mastery learning, a component of competency-based education, which demonstrated the viability of bringing almost 90% of the learners up to the designated levels of competence. Cross (9) discussed mastery learning and stated that ideally all students would earn A grades, and

would be able to take as long as necessary to accomplish the level of mastry required in the performance objective for the overall course competencies. According to Schein (28) a well-planned competency-based program should improve learner competency as well as general attitudes toward learning, and give students more opportunity to select and guide their own learning experience. These are skills that are essential as students leave formal institutional education for their profession, where continuing education is a must because of the dynamic and endlessly developing nature of most professional fields.

To understand this increasing interest in and positive support for CBE by educators, it is necessary to know how learning and instruction are defined when used in a competency-based educational environment. One key characteristic of CBE is that there is a minimum of things that a student is expected to learn and retain. Thus learning in CBE programs parallels the following general definition of learning stated by Gagné (11).

> Learning is a change in human disposition or capability, which can be retained, and which is not simply ascribable to the process of growth. The kind of change called learning exhibits itself as a change in behavior and the inference of learning is made by comparing what behavior was possible before the individual was placed in a "learning situation" and what behavior can be exhibited after such treatment. The change must have more than momentary permanence; it must be capable of being retained over some period of time.

In contrast, instruction is the process or means by which information, knowledge, and/or skills are imparted to the learner. In reference to competency-based educational programs,Elam (10) has

offered the following more descriptive definition of instruction and its role in the development of individual competence.

> The process that is intended to facilitate the development and evaluation of the learner's achievement of competencies specified. Instructing is not an act of a single teacher or a text simply describing knowledge; but it entails skilled consultation, facilitation, and assessment of students' achieving preset competencies.

Hart (13) indicated that the phrase "competency-based" is a recently coined name that cannot be found in standard dictionaries. "Competence," however, can be defined as "adequacy for a task" or as "possession of required knowledge, skills, and abilities." She believes that, in this broad sense, all types of instruction aim for competence, with the development of qualified individuals who possess required knowledge and skills. More specifically, as related to professional career training, Howard and Schiller (14) define competency as the minimum knowledge, skills, and affective behavior, and/or judgment deemed essential for a professional person.

According to Hart (13), in competency-based education, the emphasis shifts from the teacher and the teaching process to the learner and the learning process. The instructional focus is on the needs and accomplishments of the student because emphasis is placed on stated objectives and student personalization. Howard and Schiller (14) characterize the process of competency-based education as follows: students know the role for which they are being prepared; the cognitive affective, psychomotor skills, or other qualities they must demonstrate; and the way their performance will be evaluated.

As identified and described by Howard and Schiller (14) the basic structure of a competency-based educational program incorporates three major components: specific listings of (a) competencies, (b) performance objectives, and (c) evaluative criteria for assessing student achievement of the objectives. The competency statements are program-related and generally very broad. Performance objectives are specific and course-related and are the means by which the students demonstrate personal competence. Competency is then evaluated against a specific set of evaluative criteria with an expected level of performance of the behavior(s) stated in each objective. In competency-based programs, students are evaluated on how well they measure up to the stated standard, not on how their performance compares with that of other students. Similarly, Bell (6) has commented that the basic rationale of CBE evaluation is that it is systematic, and continually looks at the whole and suggests that each evaluation of a specific learning activity is directly related to a performance objective which, in turn, is directly related to the expected level of competency being developed.

In order to achieve competence, students must have opportunities to apply the technical knowledge learned in the classroom. Bell (5) states that learning opportunities are necessary if students are to attain specific levels of expected competencies. Provisions must be made for the learner to practice behaviors implied in the required competencies. Watson (32) supports this premise and stresses that clinical or field site experiences should be planned to occur concurrently or to follow as soon as possible the theory presented in

the classroom. Such close coordination of classroom and laboratory or field assignments keeps experiences from being so disconnected that the learner fails to achieve the overall level of competence desired. Such non-didactic experiences become coordinating activities in which the student synthesizes knowledge with practice. This general theory is also supported by Infante (16) who says that field experience must parallel classroom instruction so that the learner recognizes a direct relationship between course content and laboratory or field site activities.

Hall and Jones (12) emphasize that the learning of a large list of individual skills is of little value unless those skills can be combined and interrelated so that with practice the results produce a capability for a composite performance by the learner that is greater than the sum of the individual skills. Powers (24) believes that theory must be related to reality; fact must be seen in the context of process. In an applied field like foodservice, what is applied is knowledge, the knowledge dealt with principally in the classroom. Lewis and Beaudette (18) also address this issue by noting that observation without participation, analysis, and evaluation will contribute little to the development of professional competency. These authors point out that knowledge of facts can be condensed into a compact package and programmed, but skill development cannot. The acquisition of skills takes place in the real world, in the environment of the profession which can be neither stereotyped nor packaged. In the opinion of Watson (32), learning which takes place in the environment or atmosphere in which the graduate is expected to function is enlightening

and stimulating. Students should experience personal participation with gradually increasing responsibilities which contribute to the development of desired proficiency.

Historical Development of Educational Standards for the Dietetic Profession

As reported by Barber (4), the early leaders of the American Dietetic Association (ADA) exhibited concern for dietetic education and wanted to lay the foundation for a truly professional group that would maintain high aims by continually striving to make quality academic programs available to students. As early as 1903, the academic training furnished by the domestic science schools was improved by the inclusion of practical training in the institutional setting in which a student was to function. In Barber's view, this could be considered the forerunner to the dietetic internship or supervised clinical experiences now required.

Barber (4) also related that, with the founding of the American Dietetic Association in 1917, four specific interest sections were established: Dieto-therapy, Teaching, Social Welfare and Administration. The members of the Teaching Section were concerned most specifically with defining the role of the dietitian and her educational needs, and with developing educational standards for the profession. In 1924, the Education Section (formerly called the Teaching Section) presented minimum specifications for a course of study for student dietitians, which was approved by ADA in 1927. This effort included recommended basic courses in a four-year college program plus a minimum of six months of

hospital experience to include administrative, therapeutic, and social service work. Since 1927, several modifications in the basic minimum academic requirements for dietitians have been made, which exemplify the statement made by Dr. Mary deGarmo Bryan in 1943 at the 27th Annual ADA Meeting (1) in which she proclaimed that the maintenance of standards for the profession and, when necessary, raising them has always been and will always be the task of the Section on Education.

The most recent revision of academic requirements, called "Plan IV, Minimum Academic Requirements for A.D.A. Membership," was approved as a pilot program in 1970 and was officially adopted by ADA, effective July 1, 1972 with mandatory compliance by all college and university ADA approved dietetic programs by January 1, 1980. As reported in the Annual Reports and Proceedings in 1972 (3), the minimum academic requirements for Plan IV are now expressed in terms of knowledge areas and basic competencies rather than by designation of specific courses and numbers of semester credit hours as had been done in the past. The intent of Plan IV is to provide a conceptual framework for educators which permits freedom and flexibility for the development of curricula and courses by individual institutions.

Competency-Based Education in Dietetics

During the 1970's the concept of competency-based education for dietetic professionals was adopted by ADA and has been firmly supported by dietetic educators in a concerted attempt to establish standardized evaluation criteria for professional registration by the Association. In her official president's report presented at the 55th Annual ADA

Meeting in 1971 (2), Katherine Manchester stated that the development of definitions of competencies required for entry-level positions in the field of dietetics was overdue. In 1972, support for a competency-based format for dietetic education was further strengthened by the adoption of Plan IV, Minimum Academic Requirements for ADA Membership.

In 1972, Cagguila, Chairman of the Dietetic Internship Council was commissioned by the Executive Board of ADA to begin development of entry-level competency statements for the generalist dietitian as a first step in identifying essential competencies for the profession as a whole (3). In 1972, the working draft of these competency statements by Cagguila (8) was used as the basis for the research conducted by Lloyd and Vaden (19). Their work attempted to identify the competencies judged to be the most essential for beginning dietitians by having current dietetic practitioners indicate their performance expectations of entry-level generalist dietitians. The findings from this study provided a starting point for a mastery learning approach to the development and evaluation of curricula in dietetic education. Once refined, the identified essential competencies could provide the basis for a comprehensive competency-based educational system. In support of this activity, Lewis and Beaudette (18) postulated that this trend toward competency-based education in dietetic programs should lend impetus to the coordination of didactic and laboratory or field activities by focusing attention on the development of skill or expertise by students, known as professional competency.

In a further effort to establish a competency-based educational approach to dietetics, in 1978, the newly formed ADA Council on Educational Preparation, with the support of the ADA Board of Directors, appointed a special Task Force to develop a uniform set of minimum competencies for the profession of dietetics irrespective of specialized career interests (25). In order to accomplish this, the Task Force felt it must first develop a conceptual framework for the profession that would serve as essential preliminary work for competency-based education. The eight recommendations proposed by this Task Force (27) reflect a master plan for assuring quality, relevance, and responsiveness in dietetic education, practice, and continuing education. Subsequently, a committee was appointed to develop an interpretive comprehensive master plan to provide direction for implementing this report for future dietetic educators and practitioners (29). Reports concerning progress in the development of such a master plan for the profession of dietetics by this committee have not, as yet, been released for publication.

Entry-Level Skill Variation Among Dietetic Graduates

The American Dietetic Association attempts to standardize the curriculum content of two- and four-year dietetic programs in post-secondary educational institutions through the Association's approval process regarding the courses in each institution's study program which are necessary to meet the minimum academic requirements for membership eligibility in the Association. Despite this continual effort at the

national level to maintain minimum academic standards for professional qualification, the literature contains numerous references in which internship directors, traineeship directors, employers, and dietetic practitioners report considerable variance among dietetic graduates with respect to the degree of entry-level competence in basic technical and managerial skills (15, 19, 20, 26, 27, 29).

An extensive survey conducted in 1959 by Miller (20) investigated the views and concerns of Michigan State University dietetic graduates, employers, and dietetic educators of seven major universities concerning academic preparation for professionals in the area of foodservice management. The findings of this researcher reflected agreement within and among these three groups concerning (a) the need for increased understanding of the basic skills and responsibilities of management and (b) the need for increased student opportunities for practical experience under supervision to develop the technical and managerial skills essential for successful entry and professional advancement in the field of administrative dietetics.

Although during the 1960's and 1970's, to stay abreast with rapidly changing developments in the field of foodservice systems management, particular areas of knowledge and essential skills have been subject to considerable modification, findings from more recent investigations (15, 19, 29, 34), regarding deficiencies in the entry-level competence of dietetic graduates indicate that the same types of inadequacies reported by Miller in 1959 remain dominant. These findings further suggest that the design of dietetic academic programs should be

critically examined and reevaluated in relation to present day course content needs, available learning materials and instructional methods which could more effectively assist students in the integration of theoretical classroom learning with supervised practical experiences in the development of minimum entry-level proficiency.

Recent writings of leaders in the profession (12, 13, 14) give credence to the belief that a competency-based approach to the design of academic curricula for dietetic majors could effectively alleviate some of the qualitative differences which exist among undergraduate dietetic training programs currently offered in American colleges and universities. If competency-based standard curricula content can be identified, the logical next step to improve the preparation of students for entry-level positions is to attempt to identify and standardize the learning experiences within these training programs to attain minimum acceptable quality outcomes for all dietetic students.

In their 1978 report (27), the Task Force on Competencies for the ADA Council on Education Preparation alluded to the difficulty and complexity of preparing quality practitioners which often mediates against excellence. This feeling is also reflected in the concern of the American Dietetic Association for accountability of members and for concern of the members for excellence in the form of quality assurance standards for self-evaluation. The Task Force also pointed out that increasing manpower needs and rising student enrollments in dietetic programs have led to a variety of alternative routes to achieve membership eligibility with markedly different as well as

unequal basic eductional experiences. Such a situation produces graduates (soon to be practitioners) with a wide divergence of professional entry-level skills and abilities.

Competency-Based Learning Materials in Foodservice Management

A review of the publications (texts and laboratory manuals) on the market today reveals very few in the field of foodservice systems management which effectively support the use of a competency-based model of instruction as described by Hart (13) and Howard and Schiller (14). The few that are available (21, 22, 23, 30) focus on selected aspects of the field rather than a comprehensive approach to the interrelatedness and interdependence of the essential components of a total foodservice system in the management of volume feeding operations.

The workbook designed by Miller (21) is for use in a technical trade education program in foodservice/hospitality, and includes such general service training topics as waiter and waitress procedures, liquor service, hotel front desk procedures, and housekeeping tasks. The "training goals" which are briefly stated as performance objectives, such as "Write employee schedule," or "Complete food order for one week," are merely listed, with no details as to how they are to be accomplished or what standards are to be met. This publication does not address managerial functions associated with food production and service or supervisory skills basic to the management of personnel in foodservice settings. This workbook is appropriate for use in an employee apprenticeship or cooperative education program rather than a professional education program at the college or university level.

The handbook authored by Smith and Crusius (30) is a food preparation laboratory manual for quantity cookery classes. Most aspects of management appear to need more intensive study than are included in this publication. The authors do offer "Suggested Studies" which are listings of activities with no detailed instructions for the student or the instructor. Examples of such "studies" are: "Make a study of fatigue on repetitious jobs" (under work simplification) and "Suggest a training program or demonstration on some specific techniques to be used on a given job" (under personnel). Such study topics might be appropriate for off-campus student assignments but require much more detail and direction for both the student and instructor.

The publications by Mizer and Porter (22, 23) present a unique combination of a text and a laboratory manual. Seventy-five percent of the information presented is focused on techniques of quantity food preparation, while only 25% addresses various operational and supervisory skills. Chapters in each are coordinated with specific student exercises designated for the laboratory portion of the course. Suggested learning exercises are included that encourage independent student activity on a limited variety of topics. Competency goals are presented for each topic, but they are worded in non-measurable, subjective terms such as "to be aware of . . ." or "to be familiar with. . . ." Although these publications are designed for beginning level college students, they emphasize only one facet of foodservice operation--the preparation of menu items for quantity service.

Among the publications currently available, none appear to be designed for the beginning development of the technical, supervisory,

and decision-making performance skills so essential for the preparation of students for entry-level administrative positions in foodservice systems management. Furthermore, the formats of the few publications which are available do not effectively support a competency-based model of instruction for foodservice systems management.

CHAPTER III

METHOD OF INVESTIGATION

The instructional model devised and hereinafter presented as a competency-based approach for the design of a series of instructional learning units appropriate for inclusion in a beginning level course in foodservice management in post-secondary educational institutions was inherently influenced by the structural design and the overall learning objectives for an established course offered at Mercy College of Detroit. Following is a descriptive overview of the course for which this instructional-learning unit was planned.

Course Overview

COURSE TITLE: Food Systems Management I

> Study of foodservice operations, including purchasing, storage, preparation and service; stress on sanitation and safety. Supervisory functions are studied such as interviewing, controlling food and labor costs, training, employee evaluation plus topics such as work simplification and data processing. (Mercy College of Detroit, 1979-81 Catalog)

CREDIT VALUE: 7 semester hours (lecture 4 hours; laboratory 3 hours)

PREREQUISITE: College level beginning course in foods

TYPES OF EDUCATIONAL PROGRAMS SERVED:

- Dietetic majors
- Foodservice management majors
- Business majors with a foodservice minor
- Education majors securing an occupational foodservice endorsement for the Michigan Department of Education.

Course Structure

Lecture. Two 1 hour 40 minute lecture periods per week are scheduled for a semester of 15 weeks. Of these 30 class periods, 28 (14 weeks) are devoted to classroom instruction with the remaining 2 (week 15) used for final examination.

Lecture topics and content, and in-class exercises are planned to correspond with and be supplemented by out-of-class reading and exercise assignments. Handouts indicating major lecture topic headings and space for note taking are provided to encourage orderly compilation of student notes and to maximize the amount of material which can be covered effectively during the lecture periods. The variety of instructional-learning methods used include traditional instructor lectures and demonstrations, small student group exercises and discussions, film strips and movies, guest speaker presentations, and student presentations.

Laboratory. Two 6½ hour laboratory periods per week are scheduled for the 15 week semester. Each period includes a half-hour break for lunch. Laboratory sections are limited to approximately 15 students per section with the number of sections per semester governed by total course enrollment. The first 14 laboratory periods (weeks 1 through 7) are held in various on-campus foodservice facilities. The second 14 laboratory periods are spent in off-campus foodservice operations in a variety of community facilities such as hospitals, nursing homes, schools, and other institutions. In general, only two students are assigned to the same off-campus field site for a given laboratory period. During the semester students are rotated among the available

off-campus field sites for exposure to different types of foodservice operations and systems. The two laboratory periods of the fifteenth week are reserved for student and instructor evaluations related to the laboratory portion of the course.

On-campus and off-campus laboratory assignments provide opportunities for application of theories and methods presented and discussed during the lecture portion of the course. Assigned laboratory activities provide participative involvement in four areas:

1. quantity food purchasing, receiving, storage, preparation, and service;
2. sanitation, safety, and equipment maintenance checks;
3. supervisory functions related to employee recruitment, interviewing, training, and performance appraisal; and
4. supervisory functions related to materials and work flow charting, job analysis/job descriptions and the use of control mechanisms in food and labor cost containment.

All laboratory activity assignments are planned by the course instructor. On-campus laboratory activities are under the direct supervision of qualified laboratory instructors. Off-campus field site activities are under the direct supervision of on-site adjunct instructors in cooperation with the course instructor and/or laboratory instructors. To assure coordination of field site assignments and to monitor student progress, pre- and post-conferences are held each week for each laboratory section to review the off-campus assignments just completed and to brief students regarding their next off-campus assignment.

Course Objectives

The twenty-six performance objectives identified for this comprehensive course in foodservice management for beginning-level students in this post-secondary educational setting cover a wide range of interrelated knowledges and skills essential to the development of competent foodservice management professionals. For ease in presentation they are divided into five major categories.

1. Sanitation and Safety

   The student will:

   a. apply personal and professional standards of hygiene as required by the appropriate departments of public health;

   b. demonstrate proper sanitation standards in foodservice operations by following procedures required by appropriate departments of public health and various foodservice departments;

   c. practice safe techniques in all food handling situations and report and/or correct those that are not safe; and

   d. describe the correct methods used to extinguish the three common types of kitchen fires.

2. Quantity Food Preparation

   The student will:

   a. identify and use dry, fluid, and weight measuring utensils and equipment in order to prepare quantity recipes properly;

   b. adjust standardized recipes to yield specified quantities of food; and

   c. apply basic cooking skills in quantity food preparation using quantity recipes for a variety of assigned products.

3. Quantity Food Service

The student will:

a. contrast and compare the components of a variety of foodservice operations such as conventional, convenience, cook-chill, and cook-freeze; and

b. design a workable, thematic merchandising program for a given foodservice facility.

4. Equipment

The student will:

a. use and maintain foodservice equipment following prescribed procedures;

b. compare and contrast the equipment and procedures used in the operation of two types of dishwashing machines, flight and rack; and

c. describe how computers can be used to increase the operating efficiency of foodservice departments.

5. Supervisory Skills

The student will:

a. demonstrate knowledge of a supervisor or dietetic technician's role on the management team of a foodservice department by preparing an organization chart of a field site foodservice department;

b. evaluate basic supervisory skills such as planning, scheduling, problem solving, delegation, and decision making in an assigned field site;

c. apply the principles of menu planning in preparing regular and modified diet menus for quantity food production use;

d. cost standardized recipes to determine portion costs as a basis for calculating effective selling prices;

e. use food cost control mechanisms in preparing food production work sheets, calculating finished product yields, and using leftover foods effectively;

f. identify foodservice pilferage controls being used (or that are absent) at an assigned site;

g. use labor cost control mechanisms in preparing an employee schedule and a job analysis/job description;

h. identify work simplification principles used in a specific job operation;

i. apply knowledge of principles and techniques of employment interviewing in a simulated job interview situation;

j. prepare and present an in-service training program as assigned;

k. use a performance appraisal form to evaluate an employee's performance;

l. develop a counseling approach designed to stimulate employee motivation through participation in simulated situations;

m. identify basic differences in union and non-union foodservice operations by developing a list of advantages and disadvantages of each system; and

n. independently prepare a plan to feed a group of people attending a specific type of function as assigned. The plan is to include:

    1) appropriate menu;
    2) adjusted quantity recipes;
    3) food specifications;
    4) purchase orders;
    5) food production work schedules;
    6) employee schedules; and
    7) dining room diagram.

Course Orientation

Because of the variety of instructional methods and diverse instructional-learning environments used in the conduct of this course, a three-phase orientation to the course is essential for all students enrolled in this beginning-level course in foodservice management.

Separate content guides for the first lecture class, first on-campus laboratory class, and first off-campus field site class have been developed to assist the instructors in this orientation process. A copy of each of these guides has been included as Appendix A, pages 53 through 62.

Experimental Foodservice Learning Unit

The instructional learning unit designed for this study is divided into eight skill performance packets or subsets based on a selected basic competence in foodservice management. Each packet includes practical application of foodservice management theories and methods learned in the classroom in simulated and/or in real quantity foodservice settings.

Focus

The focus of this unit is on the use and control of foods and materials in a quantity foodservice setting and addresses, in part, competency statement #306, "Manage a system of cost control" as given by Howard and Schiller (14). As developed, the eight subsets are designed for additive learning and intended for use in the numerical order designated. Specifically, this experimental instructional-learning unit addresses course objectives 2a, 2b, 5d, 5e, and 5f. As performance objectives for the development of skill competence, the eight packets of subsets for this foodservice learning unit are topically identified and ordered as follows:

I. Measuring Ingredients and Calculating Food Yields;

II. Costing Quantity Recipes;

III. Determining Effective Selling Prices;

IV. Adjusting Quantity Recipe Yields;

V. Preparing Production Orders for Kitchen Workers;

VI. Calculating Finished Product Yields;

VII. Using Leftover Foods Effectively; and

VIII. Identifying Avenues of Food and Materials Pilferage and Theft.

Instructional Packet Components

Three basic types of materials were developed for each of the eight packets of the experimental learning unit: instructor guides, student activity learning materials, and evaluation forms to assess student performance and achievement. The specific material parts for each packet includes:

1. Instructor Guides
    a. Lecture and In-Class Activities
    b. Laboratory Activities
    c. Field Site Activities
2. Student Activities
    a. Student Directions
    b. Lecture Related Materials
        1) Performance Objective Pre-Test
        2) In-Class Exercise
        3) Out-of-Class Assignment
    c. Laboratory Exercise
    d. Field Site Assignment

3. Student Performance Evaluation Forms

   a. Summary of Competence Level Achieved

   b. Quantity Cooking Assignments--On-Campus Laboratory Class.

A representative packet of the types of materials developed for this experimental foodservice learning unit on the topic, "Measuring Ingredients and Calculating Food Yields" (Performance Objective I), has been included as Appendix B, pages 64 through 95.

Instructional Unit Testing

The test sample included the 25 students enrolled in HEC 321--Food Systems Management I at Mercy College of Detroit, Winter Semester, January-May, 1980. Of these, 18 (72%) were dietetic majors, 6 (24%) were foodservice management majors and 1 (4%) was an education major securing an occupational foodservice endorsement for the Michigan Department of Education.

Lecture classes were held on campus. The on-campus sites used for laboratory assignments included the main production kitchen, student cafeteria, student grill, and the faculty lounge located in the campus Conference Center. Off-campus field sites used for laboratory assignments included the foodservice departments of Mt. Caramel Hospital, Grace Northwest Hospital, Sinai Hospital, Botsford Hospital, Detroit Osteopathic Hospital, Evangelical Nursing Home, Ford Motor Company, Harper Hospital, Bon Secour Hospital, Providence Hospital, and the Walter Reuther Facility (for the mentally ill).

Instructional Unit Evaluation

Student scores on four types of performance activities were used to assess the learning effectiveness of each packet of the instructional-learning unit for each member of the class. Individual student achievement percentages, based on the relationship of actual scores to highest possible scores, were calculated for the out-of-class written assignments, on-campus laboratory assignments, off-campus field site report, and written test questions specific to each performance objective of the experimental unit which were incorporated into the second and/or third written examinations for the course.

The relative effectiveness of each instructional-learning packet or subset and of the instructional unit as a whole was determined by calculating the percentage of students who demonstrated at least 80% proficiency in meeting the expected beginning competency standards for each performance objective included in the experimental instructional unit.[1] Finally, to conform with the letter grading system of Mercy College of Detroit, the grand percent achievement for each student for the instructional-learning unit (8 subsets) was converted to a letter grade according to the following scale: A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69%, and F = below 60%.

---

[1]The 80% proficiency level was a pre-established department standard and was not under the control of the investigator.

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this research project was to develop a competency-based learning unit with eight skill performance subsets and appropriate instructional materials that would allow practical application of foodservice management theories and methods learned in the classroom. This was viewed as a pilot study to determine the effectiveness of this instructional-learning approach for beginning level college or university students in the study of foodservice systems management.

The experimental learning unit focused on the use and control of foods and materials in quantity foodservice operations and addressed, in part, competency statement #306 "Manage a system of cost control" as given by Howard and Schiller (14). The eight subset skills addressed the following topics:

I. Measuring Ingredients and Calculating Food Yields;
II. Costing Quantity Recipes;
III. Determining Effective Selling Prices;
IV. Adjusting Quantity Recipe Yields;
V. Preparing Production Orders for Kitchen Workers;
VI. Calculating Finished Product Yields;
VII. Using Leftover Foods Effectively; and
VIII. Identifying Avenues of Food and Materials Pilferage and Theft.

The experimental instructional-learning unit was tested in a seven semester credit hour (lecture and laboratory) beginning level food systems management course at Mercy College of Detroit with 25 enrollees, Winter Semester 1980. The course was a curriculum requirement for all students enrolled.

Test Sample Characteristics

Among the 25 study participants, 18 (72%) were dietetic majors, 6 (24%) were foodservice management majors, and 1 (4%) was a high school vocational education commercial foods teacher seeking occupational foodservice endorsement from the Michigan Department of Education. All students in the test sample were either freshmen or sophomores with the exception of the high school vocational education teacher who had special student status.

In an effort to characterize the subjects in the test sample, a student profile indicating major professional interest and foodservice experience was obtained from each student at the beginning of the semester. Students were asked (a) to indicate whether their primary professional interest was in the area of therapeutics or in the area of foodservice systems management, and (b) to describe briefly any previous foodservice experiences they had had and/or present jobs they held where some phase of quantity foodservice was involved. These descriptions of experience were then classified into four experience level categories by the investigator: none, very little, some, and considerable. The information gained was deemed essential because of its possible influence on students' attitudes toward and interest in

the particular topics selected for inclusion in the experimental instructional-learning unit.

Summarization of the student profile data regarding major area of professional interest revealed that 14 students (56%) indicated therapeutics whereas only 11 students (44%) stated foodservice systems management. Of the 18 dietetic majors enrolled in the course, only 4 preferred foodservice systems management over therapeutics. Among beginning level undergraduate dietetic majors a professional career preference ratio of 14 to 4 (78 to 22%) for therapeutics vs. foodservice systems management is a relatively common occurrence.

Review of the previous and/or concurrent foodservice work experience classification data showed 13 students (52%) with no experience, 3 students (12%) with very little experience, 6 students (24%) with some experience, and only 3 students (12%) with considerable experience. The levels of foodservice work experience indicated by the 18 dietetic majors were 11 (61%) with none, 3 (17%) with very little, 3 (17%) with some, and 1 (5%) with considerable.

There may be a variety of reasons for the low percentages of dietetic students who have foodservice work experience. The general public "image" of a professional dietitian is usually seen in the role of the therapeutic nutritionist. Because of their unawareness of the breadth of career opportunities within the dietetic profession, beginning level students frequently believe that professional dietetic practice is limited to the area of therapeutics in health care settings. It is conceivable that many of the students who identified therapeutics as their main professional interest area have felt work

experience in foodservice operations is not relevant to their personal career goals.

As teenagers, the image held of foodservice systems management may be heavily influenced by local school lunch programs and the fast food facilities which they frequent. In either of these settings, young adults often perceive the role of a foodservice manager as lacking in professional prestige and/or professional challenge. Furthermore, many colleges and universities with four-year undergraduate study programs in dietetics and foodservice systems management do little in the area of public relations to improve the public's general knowledge and awareness about the variety of professional employment opportunities available to graduates of these programs. In retrospect, if a follow-up professional interest preference questionnaire had been given at the close of the semester, it is possible that, because of increased awareness and/or understanding of the career opportunities and challenges associated with foodservice systems management, some changes in student attitudes and degree of interest toward career specialization involving foodservice systems management would have been revealed.

To determine the possible influence of previous foodservice experience on achievement levels during this learning unit, pre-test scores were evaluated to reveal foodservice skill levels at the beginning of the course. Of the 25 enrollees, only 35.5% attained a mean score of 50% or better on the eight pre-tests for the eight skill subsets. This mean included a percentage of 0 for three subsets (II, IV, V) indicating no usable knowledge regarding these topics at the beginning of the semester. Two subsets (VII and VIII) showed

a high percentage of students attaining 50% or better on the pre-test, 92% and 76%, respectively. These scores indicated more previous knowledge, perhaps due to the topics of the subsets themselves being more familiar to students, or to the progressive additive nature of the entire learning unit.

Learning Unit Evaluation

Four types of performance activities were used to measure the learning effectiveness of each subset of the eight-subset instructional-learning unit developed for this study. Individual student achievement percentages, based on the relationship of actual scores to highest possible scores, were calculated for out-of-class written assignments, on-campus laboratory assignments, off-campus field site reports and the written post-test questions related to each performance objective or subset of the experimental unit (eight performance objectives times four types of performance activities). Assessment of general class achievement for each instructional learning subset and for the instructional unit as a whole was determined by calculation of class percentage achievement means for each type of performance activity for each of the eight performance objectives (or learning subsets) and grand means for each learning unit subset and each type of performance activity. Data resulting from these calculations are presented in Table 1. The original data from which these calculations were derived are located in Appendix C, Tables 6 to 13, pages 96 through 103.

Table 1. Class Percentage Achievement Means for Four Types of Performance Activities for Eight Learning Unit Subsets (Class n = 25)

Performance Activity Type	Learning Unit Subsets								Learning Unit Grand Mean
	I	II	III	IV	V	VI	VII	VIII	
Out-of-class written assignments	87.6	87.0	94.2	91.2	88.3	90.1	97.7	85.4	90.19
On-campus laboratory assignments	91.2	89.9	87.9	91.6	87.8	89.7	89.7	88.0	89.48
Off-campus field reports	88.0	88.2	91.0	88.2	91.8	87.3	90.5	91.2	89.53
Post-test questions	86.0	82.8	90.0	80.0	80.0	92.0	92.0	91.7	86.81
Grand Mean	88.20	86.96	91.00	87.78	86.90	89.79	92.50	89.86	89.124

As shown in Table 1, class mean achievement percentages for all learning unit subsets for each type of performance activity exceeded the 80% proficiency level designated as the minimum expected beginning performance standard acceptable for the competency-based experimental instructional unit. Among learning unit subsets, class grand percentage achievement means for the four types of performance activities ranged from a low of 86.90% for subset V to a high of 92.50% for subset VII. Among types of performance activities, class grand percentage achievement means for the learning unit as a whole ranged from a low of 86.81% for post-test questions to a high of 90.19% for out-of-class written assignments. Based on gross analysis of class percentage achievement means, the data indicate that, although all class averages for demonstrated proficiency for the eight skill subsets were above 80%, percentage achievement means for the class as a whole were 2.67% to 3.38% lower for post-test written questions than for the three other types of performance activities. Differences among learning unit grand means for out-of-class written assignments, on-campus laboratory assignments, and off-campus field site reports were less than 1% (0.66 to 0.71%). These findings suggest that for this experimental instructional-learning unit accurate assessment of student achievement should be based on a variety of performance activity measurements rather than being limited to assessment by written test performance alone.

Further analyses were made to assess the influence of declared professional career interest preference and academic major enrollment status on achievement level for this experimental learning unit.

Professional Career Interest

To examine the effect of declared professional career interest preference on learning unit effectiveness, student mean percentage achievement scores were compared among unit subsets and for the unit as a whole between students with major career interest in therapeutics and students with major career interest in foodservice systems management. These data are presented in Table 2.

Students with therapeutic career interest achieved a total learning unit grand mean score of 89.23% as compared to 88.59% for students with foodservice systems management career interest, a difference of 0.64%. However, when viewing performance activity types individually, post-test scores resulted in a 2.84% difference in mean achievement scores for these two groups with therapeutic students attaining an 87.75% score and foodservice students attaining 84.91%. This mean achievement score variance compares to a variance of less than 1% (0.062 to 0.86) for achievement mean scores on the other three performance activities (out-of-class written assignments, on-campus laboratory assignments, and the off-campus field site reports). These data suggest that when compared to therapeutic dietetic students, foodservice management students do not perform as well on written test question evaluations. This difference in performance may be attributable to foodservice students having stronger "hands-on" demonstrable skills than didactic or rote learning skills. The reverse seems to be true for therapeutic dietetic students. Foodservice management students showed slightly higher total unit grand mean scores for the on-campus laboratory assignments and for the off-campus field site reports.

Table 2. Comparison of Percentage Achievement Means for Four Types of Performance Activities for Eight Learning Unit Subsets for Students with Primary Career Interest in Therapeutics and in Foodservice Systems Management (Class n = 25)

Performance Activity Type	Career Preference*	Learning Unit Subsets								Learning Unit Grand Mean
		I	II	III	IV	V	VI	VII	VIII	
Out-of-class written assignments	TH	89.0	88.1	93.7	90.7	88.6	89.9	98.3	86.1	90.55
	FS	85.8	85.4	95.0	91.8	87.6	90.4	96.9	84.6	89.69
On-campus laboratory assignments	TH	90.9	89.6	88.8	92.3	87.4	88.7	88.9	87.7	89.29
	FS	92.4	90.1	87.6	90.7	88.5	91.0	90.7	88.3	89.91
Off-campus field reports	TH	88.9	89.1	90.1	87.4	91.4	86.6	89.4	91.1	89.25
	FS	86.9	86.9	92.2	89.3	92.5	88.2	91.8	91.3	89.89
Post-test questions	TH	87.1	85.6	91.2	79.5	79.3	92.9	92.9	93.5	87.75
	FS	78.2	79.3	89.4	80.5	80.5	90.9	91.0	89.5	84.91
Subset Mean % Achievement	TH	89.0	88.1	91.0	87.5	86.7	89.5	92.4	89.6	89.23
	FS	85.8	85.4	91.1	88.0	87.3	90.1	92.6	88.4	88.59

*Career preference: TH = therapeutics (n = 14); FS = foodservice management (n = 11).

Academic Major Status

To ascertain the influence of academic major enrollment status on achievement level for the experimental instructional-learning unit subsets and the unit as a whole, student mean percentage achievement scores were compared among dietetic majors (18) (therapeutic and food-service system management career preferences), foodservice management majors (6), and the vocational educational teacher. The mean percentage achievement scores detailed by groups are shown on Table 3.

Mean achievement percentage scores in this comparison resulted in dietetic majors attaining the highest group scores for all four types of performance activities ranging from a low of 87.61% to a high of 90.80%, having a total learning unit grand mean percentage of 89.44. Foodservice management majors had the second highest group achievement scores for the total learning unit for all performance activities except post-test questions where they achieved the lowest mean scores. The vocational education teacher had the lowest mean scores on all performance activities except the post-test questions where she had the second highest mean score.

Achievement score variance among academic major groups ranged from a high of 4.36% for the on-campus laboratory assignment to a low of 1.75% for the off-campus field site report. This resulted in a total unit grand mean variance of 2.60% among these academic major groups.

The higher scores for dietetic majors may be explained, in part, by the higher secondary school GPA (Grade Point Average) required for entry into the dietetics program at Mercy College due to the heavy science requirements in that particular curriculum. Students majoring

Table 3. Comparison of Percentage Achievement Means by Academic Major for Four Types of Performance Activities for Eight Learning Unit Subsets (Class n = 25)

Performance Activity Type	Academic Major*	Learning Unit Subsets								Learning Unit Grand Mean
		I	II	III	IV	V	VI	VII	VIII	
Out-of-class written assignments	DI	89.0	89.5	94.5	90.9	88.7	90.4	97.0	86.4	90.80
	FS	84.5	79.7	94.5	92.0	86.7	89.3	99.3	83.0	88.63
	VE	81.5	82.5	88.9	91.1	87.3	88.0	100.0	81.0	87.54
On-campus laboratory assignments	DI	91.3	90.2	89.2	91.9	88.2	89.3	89.3	88.2	89.70
	FS	91.0	89.5	87.5	91.7	86.7	90.7	91.0	88.5	89.58
	VE	89.0	85.0	75.0	86.0	88.0	91.7	88.0	80.0	85.34
Off-campus field reports	DI	89.6	89.2	90.8	87.9	91.8	87.2	90.2	91.3	89.75
	FS	84.0	85.3	92.0	89.7	91.6	87.0	91.3	91.6	89.06
	VE	84.0	86.0	90.0	86.0	92.0	90.0	90.0	86.0	88.00
Post-test questions	DI	87.8	85.4	90.4	79.3	78.6	93.3	92.5	93.6	87.61
	FS	83.3	75.0	88.7	82.2	82.5	86.7	89.5	88.8	84.59
	VE	70.0	83.3	100.0	78.6	85.0	100.0	100.0	75.5	86.55
Subset Mean % Achievement	DI	89.4	88.6	91.2	87.5	86.8	90.1	92.3	89.9	89.44
	FS	85.7	82.4	90.7	88.9	86.9	88.4	92.8	88.0	87.98
	VE	81.0	84.2	88.5	85.4	88.1	92.4	94.5	80.6	86.84

*Academic major: DI = dietetics; FS = foodservice management; VE = vocational education.

in foodservice management have somewhat different criteria for entrance into that academic program. (Of the 11 students in the foodservice management professional interest group only 4 were dietetics majors.)

Another issue that may have affected the scores of these professional interest groups is that, on an average, 85% of the students in the foodservice management program at Mercy College work part- or fulltime while in college. Dietetics students, however, seldom have time to work during the semester due to the heavy academic class load and time requirements of their major program. It would appear that encouraging students to seek employment in areas of foodservice that offer "hands-on" work assignments may be helpful in increasing performance skills in areas such as those tested in this experimental learning unit.

Percentage Class Achievement

To evaluate the learning achievement effectiveness of each subset and for the learning unit as a whole for students in different academic major-career interest groups and for the total class, two comparisons were made to ascertain the numbers of students and percentages of each group with 80%+ achievement on each subset. The first comparison considered achievement for each subset as a whole without regard for performance activity type. The second comparison examined student achievement of 80%+ in relation to performance activity types within and among learning-unit subsets.

To assess the percentage of students who demonstrated at least 80% achievement in each subset and for the instructional-learning unit

as a whole the numbers of students achieving 80% or more were tabulated by academic major and career interest preference. Percentages within groups and for the class as a whole were calculated. These data are presented in Table 4.

In reviewing total class data and comparing numbers of students who achieved 80%+ among the eight subsets, values ranged from a low of 21 students (84%) achieving 80%+ on subset I to a high of 25 students (100%) on subset VI. These data resulted in an average of 93% of students attaining 80% or better on the total instructional learning unit.

Mean achievement percentage scores for each student for the four performance activities for each subset (1 x 8 = 8 evaluations) were reviewed to determine how many students in each major achieved 80% or better on all eight subsets contained in the experimental instructional-learning unit. Table 4 shows that 10 therapeutic dietetic students (71.4%) achieved such scores while 3 (75.0%) dietetic foodservice systems management students, 4 (66.7%) foodservice management majors, and the one (100%) vocational education teacher also achieved scores of 80% or better, based on subset mean scores. This resulted in 18 students (72%) who achieved 80%+ on all eight skill subsets presented in this learning unit. This differs considerably from the mean of 93% for students cited above as having achieved scores of 80% or better. Further review of original data indicated that the students who failed to attain 80%+ scores were not necessarily the same students for each subset (see Appendix C, Tables 6 through 13, pages 96 through 103.

Table 4. Numbers and Percentages of Students Demonstrating 80%+ Achievement in Each Subset and for the Total Instructional-Learning Unit According to Academic Major-Career Preference

Learning Unit Subsets		Dietetics Therapeutics (n = 14)	Dietetics Food Systems Management (n = 4)	Foodservice Management (n = 6)	Vocational Education (n = 1)	Total Class (n = 25)
I. Measuring Ingredients & Calculating Food Yields	n	11	4	5	1	21
	%	78.6	100.0	83.3	100.0	84.0
II. Costing Quantity Recipes	n	12	4	5	1	22
	%	85.7	100.0	83.3	100.0	88.0
III. Determining Effective Selling Prices	n	13	4	6	1	24
	%	92.9	100.0	100.0	100.0	96.0
IV. Adjusting Quantity Recipe Yields	n	13	4	6	1	24
	%	92.9	100.0	100.0	100.0	96.0
V. Preparing Production Orders for Kitchen Workers	n	13	3	5	1	22
	%	92.9	75.0	83.3	100.0	88.0
VI. Calculating Finished Product Yields	n	14	4	6	1	25
	%	100.0	100.0	100.0	100.0	100.0
VII. Using Leftover Food Effectively	n	13	4	6	1	24
	%	92.9	100.0	100.0	100.0	96.0
VIII. Identifying Avenues of Food & Materials Pilferage & Theft	n	13	4	6	1	24
	%	92.9	100.0	100.0	100.0	96.0
Total Learning Unit 80%+ Achievement-- Eight Subsets	n	10	3	4	1	18
	%	71.4	75.0	66.7	100.0	72.0

To assess the percentage of students who demonstrated at least 80% achievement for each performance activity type within each learning unit subset and for every subset, numbers of students were tabulated by academic major and career interest preference. Percentages within groups and for the class as a whole were calculated. These data are presented in Table 5.

The percentage of students achieving 80%+ on four performance activities for all eight skill subsets (4 x 8 = 32 evaluations) as categorized by academic major-career preference showed dietetic majors in food systems management having the highest number of students scoring 80% or better for out-of-class written assignments, on-campus laboratory assignments, and for off-campus field site reports. Therapeutic dietetic majors had the highest number of scores of 80%+ for the post-test evaluation. For the total learning unit, dietetic majors in food system management had 71.88% achieving scores of 80% or better on the 32 evaluations included in this instructional learning unit. The second highest percentage of students attaining 80%+ on all 32 evaluations was attained by therapeutic dietetic majors with 65.03%, a decrease of 6.85% from the number achieved by dietetic food systems majors. Food-service management majors had the third highest with 60.44% of the students attaining 80%+ on all 32 evaluations. The vocational education teacher had a score of 80% or better on 50% of the 32 evaluations.

To complete the evaluation of the instructional learning unit and to conform to the letter grading system used at Mercy College of Detroit, the grand mean achievement score percentage for the total instructional-learning unit was determined for each student and was

Table 5. Student Achievement of 80% or More: Four Types of Performing Activities for Four Academic Major-Career Preference Groups for Learning Subsets I Through VIII

Performance Activity Type	Academic Major-Career Preference*	Learning Unit Subsets																Achievement 80%+ on Eight Subsets	
		I		II		III		IV		V		VI		VII		VIII			
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Out-of-class written assignments	DT	12	85.7	10	71.4	13	92.9	14	100.0	13	92.9	12	85.7	13	92.9	10	71.4	10-14	86.60
	DFS	4	100.0	4	100.0	4	100.0	4	100.0	3	75.0	4	100.0	3	75.0	4	100.0	3-4	93.75
	FSM	4	66.7	3	50.0	6	100.0	6	100.0	5	83.3	6	100.0	6	100.0	4	66.7	3-6	83.34
	VE	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	1	100.00
Total class**		21	84.0	18	72.0	24	96.0	25	100.0	22	88.0	23	92.0	23	92.0	19	76.0	18-25	87.50
On-campus laboratory assignments	DT	13	92.9	12	85.7	12	85.7	14	100.0	13	92.9	12	85.7	11	78.6	13	92.9	11-14	89.30
	DFS	4	100.0	4	100.0	4	100.0	4	100.0	4	100.0	4	100.0	4	100.0	4	100.0	4	100.00
	FSM	6	100.0	6	100.0	6	100.0	6	100.0	5	83.3	6	100.0	6	100.0	5	83.3	5-6	95.83
	VE	1	100.0	1	100.0	1	100.0	0	0.0	1	100.0	1	100.0	1	100.0	1	100.0	1	87.50
Total class		24	96.0	23	92.0	22	88.0	25	100.0	23	92.0	23	92.0	22	88.0	23	92.0	22-25	92.50
Off-campus field reports	DT	11	78.6	12	85.7	14	100.0	12	85.7	13	92.9	11	78.6	11	78.6	14	100.0	11-14	87.51
	DFS	4	100.0	4	100.0	4	100.0	4	100.0	4	100.0	4	100.0	4	100.0	4	100.0	4	100.00
	FSM	4	66.7	5	83.3	6	100.0	6	100.0	5	83.3	6	100.0	6	100.0	6	100.0	4-6	91.66
	VE	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	1	100.00
Total class		20	80.0	22	88.0	25	100.0	23	92.0	23	92.0	22	88.0	22	88.0	25	100.0	20-25	91.00
Post-test questions	DT	12	85.7	10	71.4	12	85.7	7	50.0	9	64.3	13	92.9	14	100.0	13	92.9	7-14	80.36
	DFS	4	100.0	2	50.0	3	75.0	2	50.0	2	50.0	4	100.0	3	75.0	4	100.0	2-4	75.00
	FSM	5	83.3	2	33.3	4	66.7	4	66.7	5	83.3	4	66.7	6	100.0	6	100.0	2-6	75.00
	VE	0	0.0	1	100.0	1	100.0	0	0.0	1	100.0	1	100.0	1	100.0	0	0.0	0-1	62.50
Total class		21	84.0	15	60.0	20	80.0	13	52.0	17	68.0	22	88.0	24	96.0	23	92.0	13-24	77.50
80%+ achievement on every performance activity type	DT	9	64.3	6	42.9	11	78.6	7	50.0	8	63.3	10	71.4	11	78.6	10	71.4	6-11	65.03
	DFS	4	100.0	2	50.0	3	75.0	2	50.0	2	50.0	4	100.0	2	50.0	4	100.0	2-4	71.88
	FSM	2	33.3	1	16.7	4	66.7	4	66.7	4	66.7	4	66.7	6	100.0	4	66.7	1-6	60.44
	VE	0	0.0	1	100.0	0	0.0	0	0.0	1	100.0	1	100.0	1	100.0	0	0.0	0-1	50.00
Total class		15	60.0	10	40.0	18	72.0	13	52.0	15	60.0	19	76.0	20	80.0	18	72.0	10-20	64.00

*Academic Major-Career Preference: DT = Dietetic major, therapeutics (n = 14); DFS = Dietetic major, food systems management (n = 4); FSM = Foodservice Management major (n = 6); VE = Vocational Education Teacher (n = 1).

**Total class (n = 25).

converted to a letter grade using the following scale: A = 90-100%, B = 80-89%, C = 70-79%. Grades of A were given to 8 dietetic therapeutic students, 2 dietetic food systems management students, and 1 foodservice management major. A grade of B was given to 5 dietetic therapeutic students, 2 dietetic food systems management students, 5 foodservice management students, and the vocational education teacher. One dietetic therapeutic major received a letter grade of C.

Assessment of the effectiveness of the total unit was based on the percentage of students demonstrating 80% or better achievement on four types of performance activities for each of eight skill performance subsets of the experimental instructional-learning unit. With all but one member of the test sample attaining such percentage achievement scores, it appears that a competency-based instructional-learning approach does provide an effective method of teaching demonstratable foodservice management skills to beginning level post-secondary school students with a declared career preference interest in dietetics and/or foodservice systems management.

CHAPTER V

SUMMARY AND CONCLUSIONS

This investigation concerned the development and testing of a competency-based learning unit with eight skill performance subsets and appropriate instructional materials for practical application of food-service management theories and methods learned in the classroom. This was a pilot study to determine the effectiveness of using a competency-based instructional-learning approach for beginning level college or university students majoring in foodservice systems management and/or dietetics.

The experimental instructional-learning unit focused on the use and control of foods and materials in quantity foodservice settings. It addressed, in part, competency statement #306 "Manage a system of cost control" as given by Howard and Schiller (14). The eight subset skill topics selected were:

I. Measuring Ingredients and Calculating Food Yields;
II. Costing Quantity Recipes;
III. Determining Effective Selling Prices;
IV. Adjusting Quantity Recipe Yields;
V. Preparing Production Orders for Kitchen Workers;
VI. Calculating Finished Product Yields;
VII. Using Leftover Food Effectively; and
VIII. Identifying Avenues of Food and Materials Pilferage and Theft.

Four types of performance activities were designed to assess student achievement for each subset of the instructional unit.

- Out-of-class assignment(s) following the lecture(s) and in-class instructor assisted exercise(s);
- On-campus laboratory exercise with a written laboratory report;
- Off-campus field assignment in the foodservice operation of a community health care facility with a descriptively detailed written report; and
- Post-test questions addressed to the selected topics incorporated into the regular written hour examinations for the course.

The test sample consisted of the 25 students enrolled in the seven-credit beginning level foodservice management course, "Food Systems Management I" offered at Mercy College of Detroit, Winter Semester 1980. Relative effectiveness among learning unit subsets and of the instructional unit as a whole was determined by the percentage of students who on the first try demonstrated at least 80% proficiency in meeting the expected performance standard for each skill subset. In addition to student achievement levels, the data were examined to ascertain possible influences of career interest preference, academic major enrollment status, and previous and/or concurrent foodservice work experience on demonstrated performance levels. Comparisons within and among types of performance activities regarding learning effectiveness were made.

Summary of Findings

The class mean achievement percentage for all performance activities for the eight skill subsets exceeded the 80%+ proficiency level designated as the minimum acceptable standard for this instructional unit. Further examination of the data revealed that the lowest mean achievement scores were attained on post-test written question evaluations while out-of-class written assignments, on-campus laboratory assignments and off-campus field site reports all had mean score percentages two to three points higher. These findings suggest that assessment of student competence for performance skills such as those included in this pilot study should not be made on written test performance alone but should be based upon a variety of demonstratable performance activities.

Data concerning the effect of professional career interest on achievement for the total instructional unit showed less than 1% difference in achievement percentages when comparing students with major interest in therapeutics and in foodservice systems management. Further examination of these data with respect to types of performance activities showed dietetic therapeutic students attaining scores more than two percentage points higher than foodservice systems management students on post-test written evaluations. Between group variances for the other three types of performance activities (out-of-class written assignments, on-campus laboratory assignments, and off-campus field site reports) showed differences of less than 1%. Within the limits of this study, it appears that dietetic therapeutic students perform better on written tests than foodservice systems management students while there

is little difference in achievement levels between these groups when performance evaluations include "hands on" demonstratable skills.

A comparison of the influence of declared academic major on total unit learning achievement showed dietetic majors (therapeutic plus food systems management) with the highest mean achievement scores and foodservice management majors with the second highest mean scores. It is conceivable that this difference is due, in part, to the higher high school grade point average required for acceptance into the dietetic program at Mercy College of Detroit. Moreover, approximately 85% of the foodservice management majors work full- or part-time while going to college which, for these students, imposes additional time restraints regarding available study time.

Although relatively few students in this test sample had very much previous (or concurrent) foodservice work experience, the influence of such experience appeared to be minimal for this beginning level instructional-learning unit.

To evaluate the learning effectiveness of the skill subsets and for the total instructional unit, the numbers of students achieving mean scores of 80% or better for the required performance activities for the eight skill subsets were determined. These data revealed that 93% of the students in the test sample attained mean scores of 80%+ for the total learning unit. When categorized by declared academic major, dietetic food systems management majors had the highest percentage of students with mean scores of 80%+, dietetic therapeutic majors were second highest and foodservice management majors lowest. However, when the data were examined to determine how many students had attained

a mean score of 80%+ on every skill subset (mean of four types of performance activities), only 18 (72%) of the test sample demonstrated such achievement. Of these, 10 were dietetic therapeutic majors, 3 were dietetic food systems management majors, 4 were foodservice management majors, and the 1 vocational education major. Further examination of the data revealed no discernible pattern among students who failed to demonstrate a minimum of 80% achievement on one or more subsets of the instructional-learning unit.

Assessment of the achievement data according to major enrollment and career interest preference to determine how many students achieved 80%+ on all types of performance activities for all skill subsets (32 evaluations) revealed only four dietetic therapeutic majors (16% of the test sample) who consistently demonstrated this level of achievement.

Grand mean percentage achievement scores for the entire instructional unit for all students in the test sample were converted to letter grades using the following scale: A = 90-100%, B = 80-89%, C = 70-79%, D = 60-69%, and F = below 60%. As a result of this conversion the distribution of letter grades for the total instructional unit was A for 11 students (44%), B for 13 students (52%), and C for 1 student (4%).

Conclusions

Although limited in scope, the findings from this pilot study indicate that, as designed, this competency-based instructional-learning unit was an effective instructional approach for the topics selected for beginning-level students majoring in foodservice systems management

and/or dietetics. From the data comparisons made, it is evident that, in the majority of cases, students performed better in the three less threatening experimental performance activity situations (out-of class written assignments, on-campus laboratory exercises, and off-campus field site reports) than in the written question-response examination situation. Some possible reasons for this include:

1. Time limitations for experiential performance activities (e.g., one week to complete a field site report) were generous and less pressured than for the time limits set for completing a written hour examination. In the broader time frame, students can prepare and often revise their materials before submitting them for final performance evaluation.

2. By their basic design, experiential performance activities are more difficult to evaluate and require a greater degree of subjective judgment on the part of the evaluator than the grading of written objective question-response examinations. Circumstantial differences among students, instructors and/or experience settings and conditions may have influenced subjective judgments more than objective judgments made by the evaluators.

3. Because of the nature of the experiential performance activities designed for this experimental learning unit, many of the assignments, intentionally or unintentionally, could be satisfied by students working together. Under these circumstances, student learning for some is enhanced; for others this may become only a "crutch" or an easy means to complete a required task with minimal learning. However, the adage "two heads are better than one" prevails and may have provided an improved end product resulting in higher student achievement scores.

In retrospect, several aspects related to the design of the experimental instructional-learning unit are in need of further examination regarding modification alternatives for instructional methods and learning evaluation procedures.

1. In most instances, maximum point values for types of performance activities within learning unit subsets were determined in relation to the estimated student time

involvement required for completion of the assigned task. This system resulted in an array of very time-consuming calculations for the evaluators. Design of a simpler, less time-consuming evaluation process probably could be effected without reducing the precision of evaluation.

2. The effect of additive learning among the eight performance skill subsets on percentage achievement for the experimental unit as a whole should be examined in reference to the sequential presentation of subsets for maximum learning effectiveness.

3. Because mathematical skills are directly involved in the successful completion of five of the eight skill subsets, the kinds and levels of mathematical skills essential for this experimental instructional-learning unit should be investigated. Should a mathematic prerequisite be established for this beginning-level course in food systems management for which this unit has been designed?

4. Would it be useful to the instructor(s) of this course to expand the student profile questionnaire administered at the beginning of semester to include such informational items as previously completed courses in mathematics and/or algebra, previously completed or concurrent courses in foods and/or food preparation, high school grade point average, and current college grade point average?

5. Is it desirable to design and administer an opinionnaire at the end of the semester to ascertain changes in student attitudes and professional interest preferences regarding careers in foodservice management which may have been influenced by the competency-based instructional approach used for this experimental unit?

Admittedly, this investigation was exploratory in purpose to test the feasibility of using a competency-based approach in the design of all of the instructional-learning units within this college level, seven semester credit, beginning-level course in food systems management. Although the apparent effectiveness of this single experimental unit is encouraging, the validity of the instructional unit design and the reliability of the learning achievement evaluation method are, as yet, untested. In the judgment of the investigator, the experimental

unit devised for this pilot study should be used for several semesters involving different student test samples and, perhaps, different instructors before a meaningful decision can be made regarding the feasibility of using this instructional-learning model (or some modification thereof) for all of the learning units of this particular course.

APPENDIX A

THREE-PHASE COURSE ORIENTATION

Instructor Guides

APPENDIX A.1

INSTRUCTOR GUIDE--LECTURE COURSE ORIENTATION

The first lecture class of the semester, students will need to be provided with the following descriptive information and participative activities:

1. Identification of the textbooks and student manuals required for the course.

2. Printed distribution and discussion of the overall course objectives.

3. Explanation of the overall structure of the course, the major topics to be covered, the methods of instruction to be used and the types of applied learning experiences included in the course. In general, the study format for each major topic is designed to include:

    a. theoretical lecture(s) with in-classs exercise(s);
    b. out-of-class assignment(s);
    c. on-campus laboratory assignment(s); and
    d. off-campus field site assignment(s).

4. Printed distribution and discussion of the schedule of student assignments and responsibilities related to the course:

    a. required readings;
    b. student assignments with respective due dates;
    c. examinations during the semester covering lecture materials, on-campus laboratory assignments and off-campus field site experiences.

5. Student completion of a general information sheet designed to indicate the kinds and amounts of previous foodservice work experience each student has had.

6. Administration of pre-test related to the first major study topic of the course.

APPENDIX A.2

INSTRUCTOR GUIDE--ON-CAMPUS LABORATORY ORIENTATION

(First Student Experience in Quantity Foods Laboratory)

1. General Information

   A. Standards and Procedures for Laboratory--Discuss with class:

      1) student uniforms required and dress code;
      2) student name tags; and
      3) procedures for late arrival or absence from laboratory class, and make-up procedures.

   B. Facility Orientation--Take class on tour of on-campus laboratory facility including:

      1) laboratory kitchen facility including work stations, storage areas, and introduction to permanent staff members and employees;
      2) bulletin board for student schedules and announcements;
      3) storage areas for student coats, books, and personal belongings; and
      4) restroom facilities for students to use.

2. Instructor Demonstrations

   A. Pre-Laboratory Activities

      1) knife demonstrations

         a) collect needed equipment and materials for the demonstration:

            1 French, slicing and paring knife
            1 standard table knife
            1 large cutting board (18" x 24" preferred)
            3 half counter pans for finished food products
            1 steel and 1 two-sided stone
            1 three-sided stone (if possible)
            2 dry towels and 1 damp cleaning towel
            1 scrub brush to clean celery
            1 pineapple, 1 grapefruit, and 1 stalk of celery

b) If individual student practice of fruit and vegetable cutting is possible, arrange for appropriate numbers of knives, cutting boards, towels, counter pans, fruits, and celery.

c) Review the proper use of knives and sharpening procedures. (Reference: The Professional Chef's Knife, Culinary Institute of America, 1st Edition, CBI Publishing Co., 1978.)

2) Electric food slicer demonstration

a) Collect needed equipment and materials for demonstration including:

2 cleaning towels
1 container each of soapy, and clear water
1 slicer sharpener (frequently housed inside right rear corner of slicing machine)
1 piece (8 inches long) of easily sliced food such as cheese or lunch meat to use for demonstration

b) Review manufacturer's instruction manual. If not available, write or call the manufacturer, or local equipment representative and ask for a replacement copy for your model.

3) Electric mixer and attachments demonstration

a) Collect needed equipment and materials for demonstration including:

mixer bowls, dollies, adaptor rings, whips, paddles
food chopper (grinder) parts and tamper
vegetable slicer and dicer parts
large bowl on cart or stand to catch processed foods
soap and water at a clean-up sink
2 dry and 1 wet cleaning towel
foods needed for demonstration
1 cored head of cabbage cut into 4 wedges
3 lbs of dry rolls or bread to grind for crumbs
3 lbs of peeled carrots to dice

B. Demonstrations--Content Guides

1) Knives most commonly used in quantity food kitchens

a) Discuss importance of knowing the correct use and care of knives

- Knives are used on all preparation stations in the kitchen, by nearly all preparation personnel.

- Good knives are costly so should be cared for and stored correctly to maximize cutting life.

    - review procedures for washing and cleaning
    - review procedures for proper storage

- Accidents involving cuts frequently involve improper use of knives or the use of dull knives. Dull knives require more applied pressure in order to cut an object; thus the knife can slip more easily. Sharp knives are safer knives.

b) Three common knife varieties and their uses--show the following:

- French knife--used for heavy cutting and chopping of fruits, vegetables, meats, and other foods.
- Slicing knife--used for lighter cutting and slicing of fruits, vegetables, meats, and other foods.
- Paring knife--used for trimming and paring of many foods.

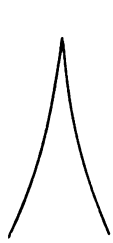
c) Sharpening knives

- Demonstrate use of stone in long-term sharpening of knives:

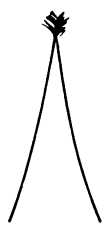
    - demonstrate 2 sided stone (place on damp cloth to prevent it from sliding)
    - demonstrate 3 sided stone if available

- Demonstrate use of steel in short-term sharpening of knives.

- On a chalk board or flip chart, explain the following magnified diagram of the end-view of a typical kitchen knife blade:



sharp blade



dull blade

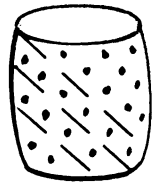
- A steel merely "straightens up" the metal particles that begin to fan out at the blade edge causing dullness. Very soon these particles begin to fan out again causing repeated dullness.

- A stone actually removes these metal particles, thus giving a longer lasting sharp edge.

d) Use of knives on several foods--demonstrate the following:

- Peel and dice a fresh pineapple:

  - Remove top with a twist of the hand, holding a towel over the top spires.
  - Using a French knife, remove top and bottom of fruit.
  - Stand pineapple on end and slice off rest of outer peel using downward slicing motions.
  - Remove only skin; leave eyes intact.
  - Remove all eyes by making "V" shaped cuts with the slicing knife, going around the fruit on a diagonal, making a narrow row from "eye to eye."



  - Cut the peeled and eyed pineapple in half from top to bottom, and then into quarters.
  - Lay each quarter on a flat side and remove the core using a diagonal cut with a French knife.
  - Remaining fruit is all edible and can be sliced or diced as desired.

- Peel and section a grapefruit:

  - Using a slicing knife, cut off one end of the grapefruit so that flesh of the fruit shows in the center forming a 2 to 3 inch diameter.
  - Holding the grapefruit in the left-hand (for a right-handed person) begin slicing off skin in ½ inch peelings going around and around the fruit.
  - Continue this operation until about 1½ inches from the unpeeled end of the fruit. Then place the fruit on a cutting board and cut off the remaining peel.

- All white inner skin should be removed during initial peel removal. If any remains after peeling the fruit, trim it off carefully.
- To section the fruit, insert the back-side of a regular table knife along the core of the fruit, and beside a section membrane. Gently pull the knife outward along the membrane, separating the fruit from the membrane.
- With one side of the section loose, insert the cutting edge of the table knife into the cut just made. When the knife reaches the core, gently turn the cutting edge upward between the membrane and the other side of the fruit section. This loosens the whole section which will then drop out.
- Repeat steps e and f to remove each section of the grapefruit.

Trim and chop a stalk of celery (1 stalk is made up of many ribs)

- Pull off ribs of celery, trimming end of the stalk as needed for easy removal of ribs.
- Wash ribs thoroughly using a scrub brush if needed to remove dirt from grooves.
- Trim off bruised or damaged celery using a paring knife.
- Place rib of celery parallel to table edge on cutting board and make lengthwise cuts down each rib dividing it into 2, 3, or 4 pieces depending on the desired size of the end product.
- Cut all ribs into narrow strips as just described.
- Grasp 6 to 8 celery strips in one hand and hold them tightly against the cutting board.
- Using a French knife, carefully chop celery into desired sizes. Continue this process until all ribs have been chopped.

2) Electric food slicer

a) Point out and explain the main parts of the slicer.

b) Demonstrate the use of this machine by slicing cheese or lunch meat. Stress safety precautions such as:

- placement of hand on carriage handle during operation and not on the food to be sliced;

- placement of hand in "catching" sliced products as they drop from the machine; and
- removal of plug from outlet prior to cleaning machine.

c) Disassemble slicer according to manufacturer's directions.

d) Wash and rinse all removeable parts of slicer in clean-up sink using warm soapy water. Rinse and dry parts.

e) Wash and rinse rest of slicer being careful when hands are necessarily close to the exposed blade of the slicer. Dry all parts of the machine.

f) Reassemble slicer according to manufacturer's directions.

g) Using appropriate manual help, move slicer from its present position on the table or stand so that the area beneath the slicer can be washed, rinsed, and dried. Replace slicer to original position.

h) Demonstrate how to sharpen the blade of the slicer following the manufacturer's instruction manual. Wipe sharpened blade with a damp cloth on both sides after sharpening to remove any dark residue that may have been deposited there from the carborundum wheels on the sharpener.

3) Electric mixer and attachments

a) Point out and explain the main parts of the mixer and the attachments.

b) Demonstrate the four major functions performed by the mixer and its attachments according to the manufacturer's instruction manual.

- mixing
- slicing (shredding)--shred 1 head of cabbage, disassemble machine, wash and dry parts)
- chopping (grinding)--grind 3 lbs of dried rolls and/or bread into crumbs, disassemble machine, wash and dry parts)
- dicing--dice 3 lbs of carrots, disassemble machine, wash and dry parts.

3. Student Participation--Practice Session

   A. The individual practice by students of the skills included in this lesson is best done on a rotation basis in small groups. The skills included are:

      1) sharpen knives on a stone and steel
      2) peel and dice a fresh pineapple
      3) peel and section a grapefruit
      4) trim and chop a stalk of celery
      5) slice a food, disassemble, sharpen, clean, and reassemble electric slicer
      6) assemble mixer and its attachments

   B. Divide the class into 6 groups, each assigned to begin in one of these 6 areas as listed above. Rotation to the next skill area is done in order above and when the instructor indicates that each group has completed its assigned task.

   C. Prior to beginning the practice skills session, ask if there are students who have had experience working on an electric slicer or mixer before. If possible, use these students as leaders and ask them to work with fellow students in learning these two skills.

APPENDIX A.3

INSTRUCTOR GUIDE--OFF-CAMPUS FIELD SITE ORIENTATION

1. Preliminary Activities

   A. Prior to the beginning of the semester, visit local area foodservice directors and managers in hospitals, nursing homes, institutions, dormitories, schools or other facilities. Determine which sites would be suitable locations for student learning experiences. Criteria for determining suitability should include:

      1) managerial interest and cooperation;
      2) qualified personnel to act as adjunct instructors; and
      3) facility scheduling constraints that might affect coordination of field site assignments with student class schedules.

   B. Prior to the beginning of student field site visits, have a general meeting of all site adjunct instructors.

      1) Distribute:

         a) copies of course objectives and performance objectives;
         b) copies of student assignments to be completed at each site;
         c) scheduled dates for each assignment at each site;
         d) names of students assigned to each site; and
         e) copies of forms for recording student attendance and student performance evaluations.

      2) Discuss and review:

         a) course objectives and performance objectives;
         b) course lecture materials and exercises students will have had prior to site visits that are relevant to assignments they will complete at the sites;
         c) each site assignment for students so all adjunct instructors understand their role in each exercise;
         d) forms to be completed by adjunct instructors such as attendance and lateness records and student performance evaluation forms; and
         e) pre-conference and post-conference format used weekly by laboratory instructor to discuss each week's assignments.

2. Student Field Site Visitations--Content Guide

   A. Schedule a two-hour student pre- and post-conference class weekly. The post-conference discussion of one week's exercise precedes the pre-conference discussion of next week's assignments.

   B. After completion of the field site visitation, hold a post-conference session with the entire class to discuss the following items regarding the current week's assignment.

      1) What problems did you encounter while completing this assignment?
      2) What impressed you most while completing this assignment?
      3) What summary statements can you make regarding your site visit and the topic assigned for this week?

   C. Following the post-conference class, hold the pre-conference session. Distribute any field site assignment sheets needed by students. Explain details of the assignment and answer any questions the students may have about this exercise.

   D. On the days of student field site visitations the course instructor and/or the laboratory instructor should rotate among the sites to visit briefly with:

      1) students to make sure they are correctly following assignment directions; and
      2) adjunct instructors to see if student instructions were clear and that there is no confusion as to assignment details for the day.

APPENDIX B

BASIC COMPETENCY: Management of a System of Cost Control

UNIT FOCUS: Use and Control of Foods and Materials in a Quantity Foodservice Setting

PERFORMANCE OBJECTIVE I: The beginning-level student will measure ingredients correctly and will calculate AP, EP, and AS food yields accurately as necessary skills in the control of food costs

APPENDIX B.1.A

INSTRUCTOR GUIDE--LECTURE AND IN-CLASS ACTIVITIES

Performance Objective I: Measuring Ingredients and Calculating Food Yields

1. Instructor Pre-Lecture Activities

   A. Assemble equipment for use in lecture-demonstration

      1) Balance scale and assorted weights
      2) Spring scale with adjustable face dial
      3) Liquid measuring cups
      4) Dry measuring cups
      5) Large measuring equipment (gallon, quart, pint)
      6) Spring scoops (minimum of two different sizes)
      7) Ladles (minimum of two different sizes)
      8) Counter pans--assorted sizes (full, 1/2, 1/3, 1/6, 1/9)
         --assorted depths (2½, 4, 6, 8 inches)
      9) Two similar counter pans for balance scale demonstration

   B. Assemble student handout materials

      1) Pre-test for Performance Objective I
      2) Yield and Conversion Chart(s)
      3) In-Class Exercise
      4) Out-of-Class Problem Assignment

   C. Recommend students bring hand calculators to lecture session(s).

2. Student Pre-Test

   Distribute pre-test for Performance Objective I, and Yield and Conversion Chart(s) prior to beginning the lecture-demonstration. Allow 10 minutes for pre-test completion. Require students to show all math calculations.

3. Lecture-Demonstration--Content Guide

   A. Equipment

      1) Explain and demonstrate correct use of weighing equipment commonly used in food service operations.

         a. Balance Scale: Using two ½ counter pans of the same depth, place one on each of the scale platforms. Place a book or similar object in one pan. Counter-balance

with the various necessary weights; determine the net weight of the book.

Definition: "Tare" = a deduction from the gross weight to allow for the weight of the receptacle or wrapping when weighing something.

To "tare" accurately, identical receptacles or wrappings must be positioned before making net weight determinations.

b. Spring Scale: Demonstrate use by placing an empty counter pan on the scale platform, turning the dial face back to zero to "tare" the pan weight, and then placing a book or similar object in the pan as the item to be weighed. Determine the net weight of the book from the reading on the dial face.

2) Explain and demonstrate correct use of measuring equipment commonly used in foodservice operations.

a. Liquid Measuring Cup: 1/4, 1/3, 1/2, 2/3, 3/4 cup gradations. Primarily used for measuring small amounts of liquid ingredients. Measurement accuracy requires eye level reading.

b. Dry Measuring Cups: 1/4, 1/3, 1/2 and 1 cup sizes. Primarily used for measuring small amounts of dry ingredients. NOT to be used for measuring liquid ingredients because there are no collars around the tops of these cups to prevent liquids from spilling while they are being carried.

For accurate measurement of dry ingredients, fill the cup and level off the cup by drawing the straight edge of a metal spatula across the brim of the cup to remove any excess.

c. Large Measuring Equipment: gallon, quart, and pint sizes. Most commonly used sizes are the gallon and the quart. Available but less commonly used is the pint. In all sizes the sides of the measures are ridged or scored to indicate 1/4, 1/2, and 3/4 amounts of the whole.

If collared, these measures can be used to measure large amounts of liquid ingredients as well as dry ingredients with accuracy.

d. Spring Scoops: available in a wide range of sizes. Used for portioning in production areas and at consumer service points. The size of a scoop is imprinted on the

moveable dasher. This number indicates the number of level scoops per quart. Scoop handles are usually color-coded for easy identification but coding systems are not standardized and may vary among manufacturers.

e. Ladles: available in a wide range of sizes. Used in production areas and at consumer service points for measurement of liquid food items. Fluid ounce sizes range from 1/2 to 72 (9 cups). The size (capacity) of a ladle is usually imprinted on the handle. The hook on the handle facilitates hanging storage.

3) Explain and demonstrate the differences among food containers commonly used in foodservice operations.

a. Counter Pans: available in a wide range of dimensions. Used as work pans in production areas and as multi-portion containers in meal service assembly areas.

A standard counter pan is 12" wide and 20" long. Smaller sizes (1/2, 1/4, 1/6, and 1/9 pans) are fractional units of the standard size pan. All standard size pans and most fractional size units are available in depths of 2½, 4, 6, and 8 inches.

b. Counter Wells: available in a range of dimensions and depths. Used as work pots in production areas and as multiportion containers in meal service assembly areas. These pots are round and available in diameters of 5, 6½, 8½, and 10' inches with capacities of 2½, 4, 7¾, and 11 quarts. This type of food container is most commonly identified in terms of liquid capacity.

c. Bakers Sheet Pans: available in several finishes and in two sizes. Used for baking and a variety of other uses in production areas. A standard sheet pan is 18" x 26" x 1". A half sheet pan is 18" x 13" x 1". Pans are made of aluminum and come in a variety of finishes including plain, perforated, and textured. This pan may also be called a "bun pan" due to its early uses in bakery operations.

B. In-Class Exercise: Foodservice abbreviations and terminology; equivalents for dry volumes, fluid volumes, weights and measures; decimal conversions; and calculation of AP vs. EP food yields.

1) Distribute exercise for in-class completion with instructor assistance and the "Yield and Conversion Chart(s)" to be used.

2) Full class participation (instructor-assisted). Provide and assist students in locating the information needed to complete questions A through D (pages 73 through 92).

3) Small group activity (without instructor assistance)

   a. Six problems requiring the calculation of AP vs. EP food yields are listed on page 73.
   b. Divide the class into six groups and assign a different problem to each group.
   c. Allow 5 minutes for calculation of the problem answers.
   d. Have a representative from each group write the calculations for their problem on the blackboard.

4) Full class participation. Reconvene the class for discussion of the information needed and the mathematical steps required to solve the six problems correctly.

C. Out-of-Class Exercise: Distribute the problems to be completed out-of-class by all students and indicate the due date for this assignment.

APPENDIX B.1.B

INSTRUCTOR GUIDE--ON-CAMPUS LABORATORY ACTIVITIES

Performance Objective I: Measuring Ingredients and Calculating Food Yields

1. Instructor Pre-Laboratory Activities

   A. Review student laboratory exercise and questions to be answered.

   B. Ten days in advance of this laboratory class, arrange for the following food items to be available in the laboratory facility in amounts appropriate for the number of students participating. Students can be assigned to work individually, in pairs, or in groups of three, if necessary. All questions are to be answered by every student whether working alone or with assigned partners.

      1) Food items required:

Each Student or Student Group Requires		Number of Students or Student Groups		Total Food Needs
3 lg onions (Spanish)	x	_____	=	_____
6 apples	x	_____	=	_____
1 lb hamburger	x	_____	=	_____
1 #10 cn wh kernel corn	x	_____	=	_____
1 #10 cn pear halves	x	_____	=	_____
1 lb flour (bread/pastry)	x	_____	=	_____

   C. Prior to laboratory class, make sure the equipment needed to answer the required questions is available.

      1) Equipment required:

         a. paring knives
         b. cutting boards
         c. fry pan or grill
         d. spatula (metal turner)
         e. colander or China caps
         f. 2 large bowls (to drain into)
         g. scale(s) to measure 1 lb and 5 lb
         h. counter pans to store drained products

i. flour sifter
j. 1 cup measures (for dry ingredients)
k. #12 scoop(s)
l. rubber scrapers

2) Gathering the above equipment can be a part of this learning experience, so having it all collected in one area is not necessarily recommended. Collecting needed equipment is part of quantity cooking and is a way of learning the details of the laboratory facility.

2. Laboratory Exercise--Content Guide

A. Distribute Laboratory Exercise to all students

B. Review the questions to be answered during the laboratory class.

C. Make Yield and Conversion Chart(s) available for student reference during the laboratory period.

D. Make student assignments by:

1) individually assigning students to one of the question groups listed below, or

2) divide class into seven groups and assign to a question group in pairs or groups of three.

Question Groups	Student Assignments
Question 1	_____
Question 2	_____
Question 3	_____
Question 4	_____
Question 5	_____
Question 6	_____
Question 7 & 8	_____

E. Use a rotation system for moving students from one question group to another, following the order listed above. For example, a student assigned to begin on Question 5 would then rotate to Questions 6, 7 & 8, 1, 2, 3, and 4. Students will need a maximum of 20 minutes per question. Math calculations can be completed at the end of the laboratory class, if not finished during the 20 minute period allotted for each question.

F. The completed Laboratory Exercise is to be turned in at the end of the class period to the laboratory instructor.

3. Post-Laboratory Activities

   A. Make sure all foods used during the laboratory class are stored properly and are marked for immediate use or consumption.

   B. Make sure all equipment used during the laboratory class is cleaned and stored properly.

APPENDIX B.1.C

INSTRUCTOR GUIDE--OFF-CAMPUS FIELD SITE ACTIVITIES

Performance Objective I: Measuring Ingredients and Calculating Food Yields

1. Instructor Preparation Activities

   A. Contact each field site adjunct instructor by telephone or in person the day before the scheduled student visits.

   B. Check the following:

      1) Which cooks will be observed by visiting students? Which student will be assigned to which cook? Have the cooks been notified of the students' assignment and when the students will arrive?

      2) Is the foodservice purchasing agent (manager or dietitian) aware of the students' pending visit and assigned interview? Is one particular time of day best for this interview? (Students could schedule the observation of the cooks around this time preference.)

      3) Will the adjunct instructor be on duty during the hours of the students' visit to answer any questions and to introduce the students to their assigned cook? Are there problems anticipated by the adjunct instructor involving students' completion of this assignment?

2. Pre-Conference Activities with Students

   A. Read assignment with students to assure that all students understand exactly what is to be done.

   B. Confirm the following information with each student:

      1) Field site to be visited
      2) Name of adjunct instructor at site to report to
      3) Transportation arrangements and site parking regulations

   C. Remind students of post-conference and the topics that will be discussed.

3. Post-Conference Discussion Activities

   A. Ask each student to:

      1) describe briefly his/her experiences at the field site and to identify any problems encountered while trying to complete this assignment, and
      2) recommend changes (if any) to improve and/or expand such assigned experiences for students visiting this particular field site.

APPENDIX B.2.A

STUDENT DIRECTIONS

COMPETENCY: Manage a System of Cost Control

AREA: Food and Materials Cost Control

TOPIC: Measuring Ingredients and Calculating Food Yields

PERFORMANCE OBJECTIVE I: The beginning student will measure ingredients correctly and will calculate food yields accurately as necessary skills in the control of food costs.

Activities Required

1. Complete pre-test covering correct procedures for measuring ingredients and calculating food yields using the Yield and Conversion Chart(s) for reference.

2. Attend lecture and complete in-class exercise pertaining to:

   A. correct procedures for measuring ingredients by dry volume, fluid volume and by weight, and

   B. calculating food yields as related to "as purchased" (AP) units versus "edible portion" (EP) units or "as served" (AS) units.

3. Complete out-of-class lecture assignment titled "Measuring Ingredients and Calculating Food Yields" using the Yield and Conversion Chart(s) for reference.

4. Complete the on-campus laboratory assignment by:

   A. measuring, weighing, or yielding specific ingredients using the procedures demonstrated in lecture to determine the answers to assigned yield questions,

   B. checking answers for yield questions with the Yield and Conversion Chart(s) and discussing any differences discovered to determine possible causes for such variations, and

   C. applying the skills in measuring ingredients and calculating food yields during subsequent quantity preparation laboratory assignments.

5. Complete the off-campus field site assignment by:

   A. answering the various questions posed in the field site assignment, and

   B. submitting a written summary of findings on or before due date.

6. Complete competency evaluations by:

   A. correctly applying these skills during the preparation of the final project for the course,

   B. demonstrating these skills in the laboratory for assessment during quantity recipe preparation, and

   C. taking the next scheduled written examination which will include these skills.

APPENDIX B.2.B.1

PRE-TEST Student_____

Possible Score = 10 Score_____ % Achieve._____

Performance Objective I: Measuring Ingredients and Calculating Food Yields

A. MEASURES AND ABBREVIATIONS (4 points)--Circle the correct answer.

T F 1. One cup of an ingredient always weighs 8 ounces.

T F 2. One cup of an ingredient is always equal to 8 fluid ounces.

T F 3. One-fourth pint is equivalent to 1 cup.

T F 4. The abbreviation "AP" means "Always Portioned."

B. FOOD YIELD CALCULATIONS (6 points)--Show calculations for each answer.

5. If the minimum drained weight (MDW) for canned diced peaches is 4# 7 oz/#10 can, what is the total weight of drained diced peaches you should get from one can?

_____
(answer)

6. When peeled, yellow cooking onions average a 95% yield. How many pounds of peeled onions would you expect to get from a 50# bag?

_____
(answer)

7. When baked, meat loaf shrinks approximately 21%. If you need 100 four oz cooked portions, how much should the original batch of raw meat loaf mix weigh?

_____
(answer)

APPENDIX B.2.B.2

YIELD AND CONVERSION CHART(S)

Performance Objective I: Measuring Ingredient and Calculating Food Yields

FRESH FRUITS AND VEGETABLES

Fruits and Vegetables	Net Weight Per Case or Bushel	EP Yield %	Approximate Conversions and Other Information
Apples	48#	90	1# EP = 1 qt chp
Bananas	40#	67	1# EP = 2 c sl
Melon, Cantaloupe	70-75#	78	1# EP = 1 3/4 c diced
Peaches	50#	88	1# EP = 2 c diced
Pineapple	6 pc/bx	60	Ea = 2.25# = 1.5 qt diced
Cabbage	50#	75	1# EP = 5½ c shrd
Carrots (cello)*	48#	74	1# EP = 1 qt chp
Celery	60#	78	1# EP = 1 qt chp
Cucumbers	50#	90	1# EP = 3 c chp (1 qt sl)
Endive	15-20#	70	
Lettuce, head	48#	70	24/2# heads/cs
Lettuce, leaf	15#	70	
Mushrooms	5#/10#	92	1# EP = 5 3/4 c sl
Onions, dry	50#	95	1# EP = 3 c chp (1 qt sl)
Peppers, green	25-30#	85	1# EP = 3 c chp
Spinach	20#	81	1# raw EP = 2 c ck
Squash, Zucchini	22#/½ bu	93	
Tomatoes	20-30 lug	90	1# EP = 3 c chp

*Come in cellophane (plastic type) bag with no tops.

CANNED FRUITS AND VEGETABLES

Fruits and Vegetables	Can Size	Min. Drn. Wt. (MDW)	Drained Measure	Other Information
Peach halves, lg	#10	4# 4 oz	2 qt diced	2½ oz/half
Peach halves, sm	#10	4# 2 oz	2 qt diced	1 2/3 oz/half
Peaches, sld. cut	#10	4# 12 oz	1 3/4 qt	
Pear halves, lg	#10	4# 3 oz	2 qt diced	2¼ oz/half
Pear halves, sm	#10	4# 2 oz	2 qt diced	1 3/4 oz/half
Pineapple, crushed	#10	5# 6 oz	2 3/4 qt	
Pineapple, chunks	#10	4# 3 oz	2¼ qt	
Pineapple, slices	#10	4#		38-40 count/#10 cn
Beans, green cut	#10	4#	2 qt	
Beans, wax cut	#10	3# 13 oz	1 3/4 qt	
Beets, diced	#10	4# 13 oz		
Corn, whole kernel	#10	4# 4 oz	2 qt ½ c	
Peas, green	#10	4# 4 oz	2 qt	
Pumpkin	#10	6# 10 oz	3 qt	
Sauerkraut	#10	5#	2½ qt	
Tomatoes	#10	4# 4 oz	2 qt	
Tomato paste	#10	6# 2 oz	3 qt	
Tomato puree	#10	6# 10 oz	3 qt	

POPULAR SPICES

Spices	1 oz equals	Spices	1 oz equals
Accent	2½ T	Mustard, dry	5 T
Bay leaf, crushed	1 c (130 ea)	Nutmeg, grd	4 T
Cayenne pepper	4 T	Onions, dehy.	5 T
Celery salt	2 T	Onion salt	3 T
Chili powder	3½ T	Oregano, grd	5 T
Cinnamin, grd	4 T	Paprika	4 T
Cinnamon, sticks	5 ea	Parsley, dehy.	1½ C
Cloves, grd	3 T	Pepper, white/black	3½ T
Garlic salt	2 T	Peppercorns	3 T
Garlic, dehy.	2 T	Poultry seasoning	5 T
Ginger	5 T	Salt	2 T
Marjoram, grd	6 T	Thyme, leaf	10 T

MISCELLANEOUS ITEMS (conversions)

Sugar, granulated	1 # = 2 c
Sugar, powdered	1 # = 3 c
Flour, unsifted	1 # = 3½ c
Flour, sifted	1 # = 4 c
Whole eggs	1 c = 8 oz (9 large or 10 medium)
Margarine, butter	1# = 2 c
Chopped nuts	1# = 4 c
Salad oil	1# = 1 pt
Spaghetti	1# raw = 2# 6 oz ck = 2¼ qt ck
Noodles	1# raw = 3# 6 oz ck = 2½ qt ck
Rice	1# raw (2½ c) = 3# 4 oz ck = 2 3/4 qt ck

POPULAR MEAT, FISH, AND POULTRY YIELDS

Item	AP to AS Yield
Bacon	25%
Corned beef	63%
Chuck roast	76%
Sirloin butt roast	78%
Ham, BRT roast	82%
Pork loin, roast	73%
Shrimp	77% EP (63% AS ck)
Chicken	35% ck boneless
Turkey	46% ck boneless

SERVING AND PORTIONING EQUIPMENT

Scoop Size	Amount It Holds
#6	2/3 c or 6 fl oz
#8	½ c or 4 fl oz
#10	3/8 c or 3 fl oz
#12	1/3 c or 2.5 fl oz
#16	¼ c or 2.25 fl oz
#20	3 1/5 T or 2 fl oz
#24	2 2/3 T or 1.5 fl oz
#30	2 1/5 T or 1 fl oz
#40	1 3/4 T or .75 fl oz
#70	3/4 T or .4 fl oz

Ladle Size	Amount It Holds
1 oz	1/8 c
2 oz	¼ c
4 oz	½ c
6 oz	3/4 c
8 oz	1 c

Glassware Size	Amount It Holds
5 oz glass	3-4 oz
8 oz glass	6-7 oz

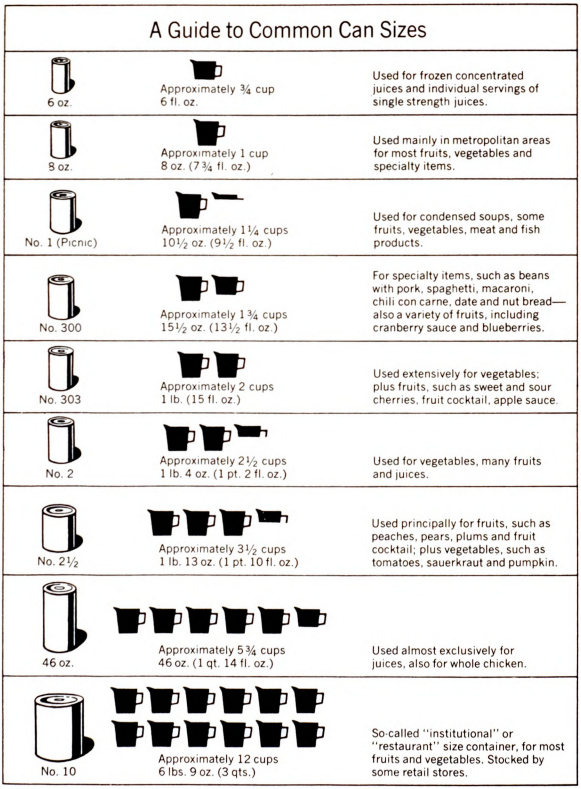


Figure 4a. Average container sizes. One no. 10 can equals two no. 5 cans, two 46-ounce cans, four no. 2½ cans, or five no. 2 cans. (Courtesy of American Can Company, Greenwich, Connecticut.)

DECIMAL CONVERSION CHART

Decimal Unit	Weight		Measure		
	Ounces	Pounds	Cups	Quarts	Gallons
.03125	1/2	...	1/2	...	...
.06250	1	...	1	1/4	...
.09375	1 1/2	...	1 1/2	...	...
.12500	2	1/8	2	1/2	...
.15625	2 1/2	...	2 1/2	...	...
.18750	3	...	3	3/4	...
.21875	3 1/2	...	3 1/2	...	...
.25	4	1/4	4	1	1/4
.28125	4 1/2	...	4 1/2	...	...
.31250	5	...	5	1 1/4	...
.34375	5 1/2	...	5 1/2	...	...
.37500	6	3/8	6	1 1/2	...
.40625	6 1/2	...	6 1/2	...	...
.43750	7	...	7	1 3/4	...
.46875	7 1/2	...	7 1/2	...	...
.50	8	1/2	8	2	1/2
.53125	8 1/2	...	8 1/2	...	...
.56250	9	...	9	2 1/4	...
.59375	9 1/2	...	9 1/2	...	...
.62500	10	5/8	10	2 1/2	...
.65625	10 1/2	...	10 1/2	...	...
.68750	11	...	11	2 3/4	...
.71875	11 1/2	...	11 1/2	...	...
.75	12	3/4	12	3	3/4
.78125	12 1/2	...	12 1/2	...	...
.81250	13	...	13	3 1/4	...
.84375	13 1/2	...	13 1/2	...	...
.87500	14	7/8	14	3 1/2	...
.90625	14 1/2	...	14 1/2	...	...
.93750	15	...	15	3 3/4	...
.96875	15 1/2	...	15 1/2	...	...
1.00	16 ozs	1 pound	16 cups	4 qts.	1 gallon

APPENDIX B.2.B.3

STUDENT IN-CLASS EXERCISE

Performance Objective I: Measuring Ingredients and Calculating Food Yields

A. Abbreviations/Terminology Frequently Used in Foodservice Operations

1. Symbols/Signs

a. When the symbol "#" appears directly after a number, it means pound(s), such as 9# flour means 9 pounds of flour,

b. When the symbol "#" appears directly before a number, it means number, such as #10 can peas means a number 10 can of peas.

c. When the sign "/" (slash line) appears, it means per, such as $.45/box means 45 cents per box.

d. When "$" appears directly after a number, it means servings or portions, such as 98$ means 98 servings or portions.

Translate the following: $1.24/2# box = _____ (see a and c above)

10$/#5 can = _____ (see b, c, and d above)

2. Terms and Abbreviations Commonly Used in Foodservice Operations.

	Example
AP = _____	raw pot roast
EP = _____	cooked pot roast
AS = _____	portioned, trimmed pot roast
BR or BRT _____	BRT Ham or Lamb
MDW = _____	MDW 4# 2 oz/#10 cn
GR WT = _____	62# GR WT (celery & crate)
NET WT = _____	60# NET WT (celery only)

3. Letter Abbreviations--Fill in proper definitions.

t or tsp = _____	chp = _____
T or Tbsp = _____	ck = _____
C or c = _____	sl = _____
pt = _____	pc = _____
qt = _____	ea = _____
G or Gal = _____	diam = _____
oz = _____	sq = _____
fl oz = _____	lg = _____
cn(s) = _____	med = _____
cs = _____	sm = _____
bx = _____	av = _____
drn = _____	hp = _____
sc = _____	w/ or $\overline{c}$ = _____
gr = _____	w/o or $\overline{s}$ = _____
jc or jce = _____	chix = _____
dz = _____	crax = _____
lb(s) _____	serv = _____

Define the following:

6 #10/cs . . . . . _____

12 #303/cs @ $7.00 . . . . _____

2 T hp salt . . . . . _____

3 qt chp tomatoes w/jce . _____

3# av cabbage heads . . . _____

4 oz sl turkey w/gr . . . _____

B. Equivalents--Fill in the blanks for each category.

1. Dry Volumes

1 T = ____ t 1 C = ____ T 1 pt = ____ C
4 qt = ____ G 1/4 C = ____ T 1 G = ____ pt

2. Fluid Volumes

1 fl oz = ____ T 1 C = ____ fl oz 1 pt = ____ fl oz
1 qt = ____ fl oz 1 G = ____ fl oz 1 T = ____ fl oz

3. Weight Measures

1 lb = ____ oz 1 oz = ____ gm 1 G = ____ lb
12 oz = ____ lb 1 fl oz ____ oz 4 oz ____ lb

C. Decimal Conversions--Use the decimal chart on the last page of the Yield and Conversion Chart(s), to complete the following:

1. Numbers to Decimals

2# 3 oz = ____# 4# 1 oz = ____# 7# 15 oz = ____#
3 C = ____ G 2 1/2 qt = ____ G 7 C = ____ G

2. Decimals to Numbers

1.28125# = ___# ___ oz 3.5# = ___# ___ oz .8125# = ___ oz
.875 G = ____ qt or ____ C .4375 G = ____ qt or ____ C
.0625 G = ____ qt or ____ C

D. Calculation of AP vs. EP Food Yields--Instructor-Assisted

Use the Yield and Conversion Chart(s) to complete the problems. (Space is provided to record your calculations)

1. If cooking onions are puchased 50#/bag AP, how many EP pounds of peeled onions will one bag yield?

2. If you have 2# AP of green peppers, how much EP weight will you have after cleaning and coring them?

3. Apples are packed ____# AP/box (net weight). How many EP pounds can you get from one box?

4. Canned salad cut peaches are packed 6 #10 cns/cs. How many pounds of drained fruit can you expect to get from 1 case?

5. If you need 16# EP of raw spinach, how many AP pounds must you have?

6. If you need 22# EP of sliced bananas for jello salad, how many AP pounds will you need?

E. Calculation of AP vs. EP Food Yields--In-class group activity without instructor assistance.

1. If a BRT ham weighs 14# AP and, after baking, weighs 11# 8 oz EP, what percent yield do you have?

2. If a boneless chuck roast weighs 26# 3 oz AP, how much will it weigh after cooking?

3. If you need 20# cooked roast beef for a party, how many AP pounds of sirloin butt will you need?

4. You will need 150 ground beef patties, each weighing 5 ounces after cooking. How much raw ground beef will you need to buy? (Assume a 78% yield.)

5. If you need 3 1/2 qt of diced apples for fruit cup, how many AP pounds of apples must you have?

6. If your recipe for waldorf salad calls for 18 lbs of diced apples, how many AP pounds of apples will you need?

APPENDIX B.2.B.4

OUT-OF-CLASS PROBLEM ASSIGNMENT Student_____

Possible Score = 27 Score _____ % Achieve._____

Performance Objective I: Measuring Ingredients and Calculating Food Yields

1. If you see "6/#10 cs @ $12.44," it means _____
(4 points)

"$13.40/60# bg," it means _____

"$1.49/# AP," it means _____

"1 #10 cn = 4# 6 oz MDW," it means _____

2. Determine the following (8 points):

2 qt = ____ fl oz	1 qt = ____#	1 T = ____ fl oz
.9375 G = ____ qt	1 G = ____ C	1 fl oz = ____ T
.375# = ____ oz	6½ oz = ____#	4 qt = ____ G

3. If you need 38# EP of head lettuce for a salad, how much AP lettuce should you purchase? (2 points)

4. If you need 32# EP of cooked diced chicken for a salad, how much AP chicken should you buy? (2 points)

5. If you need 6 qt of fresh diced EP pineapple, how many should you buy? (2 points)

6. If you need 13# 12 oz EP of diced fresh pineapple, how many should you buy? (2 points)

7. If you need 9# 5 oz of drained canned green beans for a bean salad, how many #10 cans would you need? (2 points)

8. You need 14.5# of cooked cleaned shrimp for a luncheon. How much AP "green" shrimp should you buy? (2 points)

9. You need 3½ gallons EP of shredded cabbage for slaw. How much AP cabbage should you buy? (2 points)

APPENDIX B.2.C

LABORATORY EXERCISE Student_____

Possible Score = 44 Score_____ % Achieve._____

Performance Objective I: Measuring Ingredients and Calculating Food Yields

1. Yield 3 large onions by peeling and trimming the outer dry skin. Record the following data during this process:

   AP weight _____

   EP weight _____

   Your yield % _____

   Chart yield % _____

2. Yield 6 fresh apples by sectioning into quarters, removing the core, and dicing into ½ inch pieces. Record the following data during this process:

   AP weight _____

   EP weight _____

   EP measure _____

   Your yield % _____

   Chart yield % _____

3. Cook four 4 oz hamburger patties to medium doneness. Calculate the yield by recording the following data:

   AP raw weight 16 oz

   AS ck weight _____

   Your yield % _____

   To serve a 5 oz hamburger patty cooked to medium doneness, how much would the raw patty have to weigh, based on this yield information?

   _____ oz

4. Determine the minimum drained weight (MDW) of a #10 can of whole kernel corn by draining the can contents in a small sieved colander for two minutes. Record the following data during this process:

Gross weight_____
(corn + liquid)

Net weight (MDW)_____
(corn drained)

Chart MDW_____

Your drained measure_____ qt

Chart drained measure_____ qt

Your yield %_____
(based on weight)

1# drn. corn =_____ C

Number of ½ C $/#10 cn (drn)_____

5. Determine the drained weight of a #10 can of pear halves by draining the pears in a colander for two minutes. Attempt to turn pear halves so that their centers face downward to allow collected juice to drain away. Record the following data during this process:

Gross weight_____
(pears + liquid)

Net weight (MDW)_____
(pears drained)

Chart MDW_____

Your yield %_____
(based on weight)

Count/can from label_____

Your count/can_____

In collaboration with students answering question #4, answer the following question:

Most #10 cans of fruits or vegetables yield a 60 to 65 percent yield. Did you find this to be true of the corn and pear halves? Explain your results. (2 points)

6. Weigh 1# of bread or pastry flour. It equals _____ cups. Take the same pound of flour, sift it, and remeasure it. It now equals _____ cups. Sifting creates a _____% increase in volume of flour.

   If you were writing a recipe which used flour, would you write the flour ingredient in cups, or pounds? Why? (2 points)

7. Using a #12 scoop filled to the top with water, carefully determine how many scoops of water it takes to fill a 1 quart measure.

   _____ #12 scoops

   Using your Yield and Conversion Chart(s), answer these questions:

   1 #10 can = _____ cups

   1/46 oz can = _____ cups

   #16 scoop = _____ cup

   1# raw spaghetti = _____ qt ck

   Head lettuce has a _____% yield (AP to EP)

   1 #10 cn tomatoes = _____MDW

   One 6 oz ladle holds _____ c

   1# granulated sugar = _____ c

   .625# = _____ oz

   .625G = _____ qt

APPENDIX B.2.D

STUDENT OFF-CAMPUS FIELD SITE ASSIGNMENT

Performance Objective I: Measuring Ingredients and Calculating Food Yields

Beginning the ninth week of the semester, the following field site activity will be scheduled and completed at an assigned off-campus site.

(25 pts) Measuring and Weighing Ingredients (first 4 hours)

Observe (as assigned) two different cooks from two different preparation stations for 2 hours each. The purpose of this observation is to gather data to answer the following questions which are part of the field site report. Each question should be addressed specifically and all factors evaluated which may have an influence on the activities that you observed.

1. Are both cooks you observed using the procedures for measuring and weighing ingredients as presented in lecture? If not, what procedural variations did you observe? Describe in detail.

2. Is equipment available to the cooks you observed so that they can measure and/or weigh ingredients with accuracy? If not, what types of equipment would you purchase to improve the weighing and measuring procedures in this area?

3. What other procedural suggestions, or operational suggestions do you have for improving the situations that you observed?

(25 pts) Food Yield Calculations (last 2 hours)

1. What procedures are used to determine amounts to be purchased in the following food categories?

   Fresh meats, frozen foods, fresh produce, dairy products, bakery items, canned foods, staples, beverages, and convenience foods.

2. How frequently are food yields (AP versus EP or AS) checked in this operation? Who does it and what are the procedures used?

3. Do you feel that these practices are adequate in relation to food and materials cost control for this operation? If so, why? If not, why not?

Submit dated field site report to laboratory instructor within 7 days following your visit to the facility. Reports should be prepared in narrative form, using numbered paragraphs to address the questions specified above. Reports should be typed or neatly handwritten.

APPENDIX B.3.A

SUMMARY OF COMPETENCY LEVEL ACHIEVED Student_____

Average Achievement % _____ Grade Achieved_____

Performance Objective I: Measuring Ingredients and Calculating Food Yields

Directions:

1. Record student performance data for each of the activities listed below. Calculate the average of the four achievement percentages for this performance objective.

2. Use the following scale to convert the average achievement percentage to the corresponding letter grade.

A = 90%-100%
B = 80%-89%
C = 70%-79%
D = 60%-69%
F = below 60%

PERFORMANCE RECORD					
Activities	Assignment Due Date	Possible Score	Actual Score	Achievement %	Evaluator Initials*
1. Out-of class assignment		27			
2. On-campus laboratory assignment		44			
3. Off-campus field site report		50			
4. Written exam questions		10			
		Achievement Average %			

*Evaluator comments are required for each achievement under 80%. Use space below, or the back of this form if more space is needed.

APPENDIX B.3.B

QUANTITY COOKING ASSIGNMENTS
(On-Campus Laboratory Classes)

Student_____

Date_____ Product #_____

Possible Score = Number of
Criteria Used x 5

Score_____% Achieve._____

On-Campus Laboratory Performance Rating*

Product Prepared:

_____

Quantity made:_____

Performance Level Scale:
5 = High, thorough knowledge
4 = Acceptable, good knowledge
3 = Acceptable, fair knowledge
2 = Unacceptable, little knowledge
1 = Unacceptable, very little knowledge

Performance Criteria (Indicate all that apply)		Performance Level				
		High	Acceptable		Unacceptable	
	A/NA	5	4	3	2	1
1. Recipe yield adjusted correctly for production amount needed						
2. Ingredient yields calculated correctly where needed						
3. Ingredients properly measured and/or weighed						
4. Proper ingredients used during preparation						
5. Recipe procedures accurately followed						
6. Student identified problems encountered during preparation						
7. Student identified errors that occurred in preparation						
8. Recipe and portion costs determined correctly						
9. Food cost % calculated (% of selling price)						
10. Recommendation for selling price revision based on #9						
11. Student identified effective uses of product if "leftover"						
12. Interview data summarized from 10 customers who ate product						

*Instructions regarding the use of this form are on the back of this page.

Instructions to Evaluators

1. The performance criteria listed on this form are related to Performance Objectives I, II, III, IV, and VII for the experimental competency-based instructional-learning unit. The laboratory assignments of the first 14 weeks of the course will actively encompass all of the performance criteria listed. As students' progress through the various on-campus laboratory assignments, the number of applicable performance criteria for a given laboratory session will automatically increase.

2. Each student is to be evaluated on a minimum of 6 products/recipes which he/she has made and analyzed.

3. Use a separate form for each product made by the student (minimum of 6) for which he/she is being evaluated.

4. To calculate the "Possible Score" for evaluation of student performance for each product made, multiply the number of applicable performance criteria by five.

5. To calculate the "% Achievement," use the following formula:

$$\frac{\text{Actual Score}}{\text{Possible Score}} \times 100 = \%\ \text{Achievement.}$$

APPENDIX C

INDIVIDUAL STUDENT SCORES AND PERCENTAGE ACHIEVEMENT

LEARNING UNIT SUBSETS I THROUGH VIII

Table 6. Learning Unit Subset I: Measuring Ingredients and Calculating Food Yields; Student Scores and Percentage Achievement for Four Types of Performance Activities and Mean Percentage Achievement for Subset I (Class n = 25)

Students by Academic Major		Out-of-Class Assignment		On-Campus Lab. Assignment		Off-Campus Field Report		Post-Test Questions		Subset I
		Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Percentage Achievement Mean
Dietetics (n = 18)										
Therapeutics	1	21	78	35	80	36	72	7	70	75.0
	2	22	81	38	86	45	90	6	60	79.3
	3	24	89	41	93	48	96	8	80	89.5
	4	25	93	42	96	47	94	9	90	93.3
	5	23	85	39	89	44	88	9	90	88.0
	6	26	96	43	98	49	98	10	100	98.0
	7	22	81	37	84	37	74	10	100	84.8
	8	19	70	34	77	40	80	9	90	79.3
	9	27	100	44	100	50	100	9	90	97.5
	10	26	96	42	96	48	96	10	100	97.0
	11	26	96	41	93	48	96	8	80	91.3
	12	23	85	39	89	39	78	10	100	88.0
	13	26	96	42	96	45	90	8	80	90.5
	14	27	100	42	96	46	92	9	90	94.5
Food Systems Mgt.	15	24	89	40	91	46	92	9	90	90.5
	16	23	85	40	91	45	90	9	90	89.0
	17	25	93	42	96	48	96	10	100	96.3
	18	24	89	41	93	45	90	8	80	88.0
Foodservice Management (n = 6)	19	21	78	37	84	41	82	9	90	83.5
	20	22	81	39	89	36	72	8	80	80.5
	21	21	78	38	86	38	76	7	70	77.5
	22	23	85	42	96	45	90	6	60	82.8
	23	27	100	43	98	46	92	10	100	97.5
	24	23	85	41	93	46	92	10	100	92.5
Vocational Education (n = 1)	25	22	81	39	89	42	84	7	70	81.0
Class mean		23.7	87.6	40.0	91.2	40.0	88.0	8.6	86.0	88.20
Class total for 80%+ achievement	n		21		24		20		21	21
	%		84.0		96.0		80.0		84.0	84.0

*Maximum score possible: out-of-class assignment = 27; on-campus laboratory assignment = 44; off-campus field report = 50; post-test = 10.

Table 7. Learning Unit Subset II: Costing Quantity Recipes; Student Scores and Percentage Achievement for Four Types of Performance Activities and Mean Percentage Achievement for Subset II (Class n = 25)

Students by Academic Major		Out-of-Class Assignment		On-Campus Lab. Assignment		Off-Campus Field Report		Post-Test Questions		Subset II
		Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Percentage Achievement Mean
Dietetics (n = 18)										
Therapeutics	1	77	96	81	81	38	76	12	67	80.0
	2	71	89	84	84	45	90	13	72	83.8
	3	58	73	93	93	47	94	15	83	85.8
	4	63	79	94	94	44	88	17	94	88.8
	5	71	89	88	88	45	90	18	100	91.8
	6	67	84	98	98	48	96	18	100	94.5
	7	78	97	72	72	39	78	12	67	78.5
	8	57	71	77	77	41	82	15	83	78.3
	9	80	100	98	98	50	100	18	100	99.5
	10	73	91	94	94	47	94	15	83	90.5
	11	60	75	96	96	49	98	15	83	88.0
	12	80	100	91	91	42	84	12	67	85.5
	13	71	89	94	94	44	88	18	100	92.8
	14	80	100	95	95	45	90	18	100	96.3
Food Systems Mgt.	15	70	87	94	94	42	84	18	100	91.3
	16	80	100	90	90	47	94	16	89	93.3
	17	73	91	94	94	44	88	14	78	87.8
	18	80	100	91	91	46	92	13	72	88.8
Foodservice Management (n = 6)	19	53	66	90	90	43	86	15	83	81.3
	20	70	87	91	91	39	78	14	78	83.5
	21	66	82	81	81	42	84	15	83	82.5
	22	63	79	87	87	44	88	13	72	81.5
	23	74	92	95	95	46	92	14	78	89.3
	24	58	72	93	93	42	84	10	56	76.3
Vocational Education (n = 1)	25	66	83	85	85	43	86	15	83	84.3
Class mean		69.6	87.0	89.9	89.9	44.1	88.2	14.9	82.8	86.96
Class total for 80%+ achievement	n		18		23		22		15	22
	%		72.0		92.0		88.0		60.0	88.0

*Maximum score possible: out-of-class assignment = 80; on-campus laboratory assignment = 100; off-campus field report = 50; post-test = 18.

Table 8. Learning Unit Subset III: Determining Effective Selling Prices; Student Scores and Percentage Achievement for Four Types of Performance Activities and Mean Percentage Achievement for Subset III (Class n = 25)

Students by Academic Major		Out-of-Class Assignment		On-Campus Lab. Assignment		Off-Campus Field Report		Post-Test Questions		Subset III
		Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Percentage Achievement Mean
Dietetics (n = 18)										
Therapeutics	1	18	100	29	73	41	82	14	88	85.8
	2	18	100	35	88	42	84	14	88	90.0
	3	16	89	37	93	44	88	16	100	92.5
	4	16	89	37	93	47	94	16	100	94.0
	5	18	100	35	88	45	90	14	88	91.5
	6	18	100	40	100	47	94	16	100	98.5
	7	16	89	32	80	40	80	16	100	87.3
	8	18	100	31	78	42	84	8	50	78.0
	9	18	100	39	98	49	98	16	100	99.0
	10	16	89	36	90	47	94	16	100	93.3
	11	18	100	37	93	48	96	16	100	97.3
	12	14	78	33	83	45	90	12	75	81.5
	13	16	89	37	93	47	94	16	100	94.0
	14	16	89	37	93	47	94	14	88	91.0
Food Systems Mgt.	15	18	100	37	93	48	96	16	100	97.3
	16	18	100	36	90	46	92	16	100	95.5
	17	16	89	34	85	47	94	10	63	82.8
	18	18	100	38	95	45	90	14	88	93.3
Foodservice Management (n = 6)	19	18	100	34	85	45	90	16	100	93.8
	20	18	100	33	83	47	94	16	100	94.3
	21	16	89	35	88	45	90	11	69	84.0
	22	16	89	35	88	46	92	12	75	86.0
	23	18	100	39	98	48	96	14	88	95.5
	24	16	89	33	83	45	90	16	100	90.5
Vocational Education (n = 1)	25	16	89	30	75	45	90	16	100	88.5
Class mean		17.0	94.2	35.2	87.9	45.5	91.0	14.4	90.0	91.0
Class total for 80%+ achievement	n		24		22		25		20	24
	%		96.0		88.0		100.0		80.0	96.0

*Maximum score possible: out-of-class assignment = 18; on-campus laboratory assignment = 40; off-campus field report = 50; post-test = 16.

Table 9. Learning Unit Subset IV: Adjusting Quantity Recipe Yields; Student Scores and Percentage Achievement for Four Types of Performance Activities and Mean Percentage Achievement for Subset IV (Class n = 25)

Students by Academic Major		Out-of-Class Assignment		On-Campus Lab. Assignment		Off-Campus Field Report		Post-Test Questions		Subset IV
		Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Percentage Achievement Mean
Dietetics (n = 18)										
Therapeutics	1	84	93	90	90	42	84	17	61	82.0
	2	78	87	88	88	43	86	18	64	81.3
	3	82	91	93	93	46	92	26	93	92.3
	4	82	91	94	94	47	94	27	96	93.8
	5	79	88	91	91	40	80	22	79	84.5
	6	86	96	97	97	45	90	23	82	91.3
	7	79	88	89	89	39	78	19	68	80.8
	8	72	80	83	83	37	74	19	68	76.3
	9	86	96	98	98	47	94	25	89	94.3
	10	88	98	98	98	48	96	27	96	97.0
	11	87	97	96	96	47	94	18	64	87.8
	12	74	82	86	86	42	84	20	71	80.8
	13	85	94	95	95	44	88	25	89	91.5
	14	80	89	94	94	45	90	26	93	91.5
Food Systems Mgt.	15	80	89	91	91	45	90	18	64	83.5
	16	84	93	92	92	44	88	24	86	89.8
	17	85	94	90	90	46	92	26	93	92.3
	18	82	91	89	89	44	88	20	71	84.8
Foodservice Management (n = 6)	19	82	91	92	92	43	86	24	86	88.8
	20	83	92	89	89	44	88	22	79	87.0
	21	80	89	94	94	44	88	23	82	88.3
	22	85	94	93	93	45	90	19	68	86.3
	23	89	99	98	98	47	94	23	82	93.3
	24	78	87	84	84	46	92	27	96	89.8
Vocational Education (n = 1)	25	82	91	86	86	43	86	22	79	85.5
Class mean		82.1	91.2	91.6	91.6	44.1	88.2	22.4	80.0	87.78
Class total for 80I+ achievement	n		25		25		23		13	24
	Σ		100.0		100.0		92.0		52.0	96.0

*Maximum score possible: out-of-class assignment = 90; on-campus laboratory assignment = 100; off-campus field report = 50; post-test = 28.

Table 10. Learning Unit Subset V: Preparing Production Orders for Kitchen Workers; Student Scores and Percentage Achievement for Four Types of Performance Activities and Mean Percentage Achievement for Subset V (Class n = 25)

Students by Academic Major		Out-of-Class Assignment		On-Campus Lab. Assignment		Off-Campus Field Report		Post-Test Questions		Subset V
		Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Percentage Achievement Mean
Dietetics (n = 18)										
Therapeutics	1	116	77	39	78	38	76	18	90	80.3
	2	129	86	41	82	42	84	9	45	74.3
	3	141	94	44	88	48	96	14	70	87.0
	4	134	89	42	84	47	94	14	70	84.3
	5	131	87	41	82	45	90	16	80	84.8
	6	143	95	46	92	49	98	16	80	91.3
	7	123	82	42	84	43	86	14	70	80.5
	8	122	81	42	84	43	86	16	80	82.3
	9	143	95	46	92	49	98	18	90	93.8
	10	122	81	43	86	43	86	17	85	84.5
	11	147	98	48	96	49	98	19	95	96.8
	12	126	84	43	86	44	88	15	75	83.3
	13	146	97	47	94	49	98	18	90	94.8
	14	143	95	48	96	49	98	18	90	94.8
Food Systems Mgt.	15	141	94	46	92	48	96	15	75	89.3
	16	119	79	44	88	46	92	10	50	77.3
	17	147	98	48	96	50	100	18	90	96.0
	18	128	85	44	88	44	88	18	90	87.8
Foodservice Management (n = 6)	19	120	80	42	84	43	86	17	85	83.8
	20	135	90	44	88	47	94	17	85	89.3
	21	105	70	36	72	39	78	16	80	75.0
	22	137	91	46	92	48	96	18	90	92.3
	23	147	98	48	96	49	98	16	80	93.0
	24	137	91	44	88	49	98	15	75	88.0
Vocational Education (n = 1)	25	131	87	44	88	46	92	17	85	88.0
Class mean		132.5	88.3	43.9	87.8	45.9	91.8	16.0	80.0	86.9
Class total for 80%+ achievement	n		22		23		23		17	22
	%		88.0		92.0		92.0		68.0	88.0

*Maximum score possible: out-of-class assignment = 150; on-campus laboratory assignment = 50; off-campus field report = 50; post-test = 20.

Table 11. Learning Unit Subset VI: Calculating Finished Product Yields; Student Scores and Percentage Achievement for Four Types of Performance Activities and Mean Percentage Achievement for Subset VI (Class n = 25)

Students by Academic Major		Out-of-Class Assignment		On-Campus Lab. Assignment		Off-Campus Field Report		Post-Test Questions		Subset VI
		Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Percentage Achievement Mean
Dietetics (n = 18) Therapeutics	1	63	84	49	82	37	74	10	100	85.0
	2	65	87	51	85	42	84	10	100	89.0
	3	70	93	54	90	44	88	10	100	92.8
	4	72	96	56	93	46	92	10	100	95.3
	5	63	84	51	85	44	88	8	80	84.3
	6	73	97	57	95	48	96	6	60	87.0
	7	57	76	45	75	36	72	10	100	80.8
	8	59	79	43	72	35	70	10	100	80.3
	9	73	97	56	93	43	86	10	100	94.0
	10	72	96	56	93	45	90	10	100	94.8
	11	71	95	58	97	46	92	8	80	91.0
	12	67	89	55	92	45	90	10	100	92.8
	13	69	92	55	92	47	94	8	80	89.5
	14	70	93	59	98	48	96	10	100	96.8
Food Systems Mgt.	15	70	93	57	95	48	96	10	100	96.0
	16	67	89	55	92	43	86	10	100	91.8
	17	72	96	54	90	43	86	8	80	88.0
	18	69	92	53	88	45	90	10	100	92.5
Foodservice Management (n = 6)	19	67	89	55	92	45	90	7	70	85.3
	20	69	92	52	87	42	84	7	70	83.3
	21	63	84	53	88	42	84	10	100	89.0
	22	65	87	53	88	41	82	10	100	89.3
	23	71	95	58	97	45	90	10	100	95.5
	24	67	89	55	92	46	92	8	80	88.3
Vocational Education (n = 1)	25	66	88	55	92	45	90	10	100	92.5
Class mean		67.6	90.1	53.8	89.7	43.6	87.3	9.2	92.0	89.79
Class total for 80%+ achievement	n		23		23		22		22	25
	%		92.0		92.0		88.0		88.0	100.0

*Maximum score possible: out-of-class assignment = 75; on-campus laboratory assignment = 60; off-campus field report = 50; post-test = 10.

Table 12. Learning Unit Subset VII: Using Leftover Foods Effectively; Student Scores and Percentage Achievement for Four Types of Performance Activities and Mean Percentage Achievement for Subset VII (Class n = 25)

Students by Academic Major		Out-of-Class Assignment		On-Campus Lab. Assignment		Off-Campus Field Report		Post-Test Questions		Subset VII
		Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Percentage Achievement Mean
Dietetics (n = 18)										
Therapeutics	1	50	100	39	78	39	78	10	91	86.8
	2	50	100	42	84	42	84	9	82	87.5
	3	50	100	48	96	47	94	11	100	97.5
	4	50	100	48	96	46	92	10	91	94.8
	5	50	100	44	88	45	90	10	91	92.3
	6	50	100	46	92	46	92	10	91	93.8
	7	50	100	39	78	39	78	11	100	89.0
	8	38	76	37	74	39	78	10	91	79.8
	9	50	100	48	96	49	98	10	91	96.3
	10	50	100	46	92	48	96	11	100	97.0
	11	50	100	46	92	48	96	9	82	92.5
	12	50	100	44	88	46	92	11	100	95.0
	13	50	100	47	94	45	90	10	91	93.8
	14	50	100	48	96	47	94	11	100	97.5
Food Systems Mgt.	15	48	96	46	92	47	94	8	73	88.8
	16	50	100	45	90	46	92	11	100	95.5
	17	50	100	47	94	48	96	11	100	97.5
	18	37	74	44	88	45	90	10	91	85.8
Foodservice Management (n = 6)	19	48	96	44	88	45	90	10	91	91.3
	20	50	100	45	90	46	92	9	82	91.0
	21	50	100	44	88	45	90	9	82	90.0
	22	50	100	47	94	45	90	10	91	93.8
	23	50	100	48	96	48	96	11	100	98.0
	24	50	100	45	90	45	90	10	91	92.8
Vocational Education (n = 1)	25	50	100	44	88	45	90	11	100	94.5
Class mean		48.8	97.7	44.8	89.7	45.2	90.5	10.1	92.0	92.5
Class total for 80%+ achievement	n		23		22		22		24	24
	%		92.0		88.0		88.0		96.0	96.0

*Maximum score possible: out-of-class assignment = 50; on-campus laboratory assignment = 50; off-campus field report = 50; post-test = 11.

Table 13. Learning Unit Subset VIII: Identifying Avenues of Food and Materials Pilferage and Theft; Student Scores and Percentage Achievement for Four Types of Performance Activities and Mean Percentage Achievement for Subset VIII (Class n = 25)

Students by Academic Major		Out-of-Class Assignment		On-Campus Lab. Assignment		Off-Campus Field Report		Post-Test Questions		Subset VIII
		Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Actual Score*	Percentage Achievement	Percentage Achievement Mean
Dietetics (n = 18)										
Therapeutics	1	76	76	84	84	43	86	9	75	80.3
	2	80	80	81	81	44	88	11	92	85.3
	3	92	92	90	90	48	96	11	92	92.5
	4	92	92	94	94	47	94	12	100	95.0
	5	77	77	83	83	44	88	11	92	85.0
	6	88	88	92	92	48	96	12	100	94.0
	7	72	72	79	79	42	84	10	83	79.5
	8	78	78	84	84	45	90	10	83	83.8
	9	91	91	96	96	48	96	12	100	95.8
	10	86	86	89	89	47	94	12	100	92.3
	11	93	93	86	86	46	92	12	100	92.8
	12	91	91	82	82	43	86	11	92	87.8
	13	94	94	92	92	46	92	12	100	94.5
	14	95	95	96	96	47	94	12	100	96.3
Food Systems Mgt.	15	89	89	92	92	45	90	11	92	90.8
	16	86	86	89	89	46	92	11	92	83.8
	17	92	92	88	88	47	94	12	100	93.5
	18	84	84	91	91	46	92	11	92	89.8
Foodservice Management (n = 6)	19	82	82	87	87	43	86	10	83	84.5
	20	91	91	93	93	47	94	10	83	90.3
	21	72	72	78	78	44	88	11	92	82.5
	22	79	79	84	84	43	86	11	92	85.3
	23	82	82	93	93	49	98	12	100	93.3
	24	92	92	96	96	49	98	10	83	92.3
Vocational Education (n = 1)	25	81	81	80	80	43	86	9	75	80.5
Class mean		85.4	85.4	88.0	88.0	45.6	91.2	11.0	91.7	88.86
Class total for 80%+ achievement	n		19		23		25		23	24
	%		76.0		92.0		100.0		92.0	96.0

*Maximum score possible: out-of-class assignment = 100; on-campus laboratory assignment = 100; off-campus field report = 50; post-test = 12.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. American Dietet. A. Annual Reports and Proceedings 1943-1944. Chicago, 1945.

2. American Dietet. A. Annual Reports and Proceedings 1971-1972. Chicago, 1973.

3. American Dietet. A. Annual Reports and Proceedings 1972-1973. Chicago, 1974.

4. Barber, M. I. History of the American Dietetic Association. Philadelphia: J. B. Lippincott Co., 1959.

5. Bell, C. G. "Competency-Based Education: Role Competencies Versus Entry-Level Competencies." Paper presented to the Foodservice Systems Management Education Council at Am. Dietet. A. Annual Meeting. San Antonio, 1975.

6. Bell, C. G. "Evaluation in Competency Based Education. Evaluation Strategies for Entry-Level Competencies." Proceedings of the Ninth Biennial Conference of the Foodservice Systems Management Education Council, 1977.

7. Block, J. Mastery Learning, Theory and Practice. New York: Holt, Rinehart & Winston, 1971.

8. Cagguila, A. "Competencies of the Entry-Level Generalist Dietitian." Chicago: Am. Dietet. A. (ADA Internal Report, circa 1972).

9. Cross, K. P. Accent on Learning. San Francisco: Josse-Bass, Inc., 1976.

10. Elam, S. "Performance-Based Teacher Education: What Is the State of the Art?" Washington, D.C.: Am. A. of Colleges for Teacher Education, 1971.

11. Gagné, R. M. The Conditions of Learning. New York: Holt, Rinehart and Winston, 1970.

12. Hall, G., and Jones, H. Competency-Based Education: A Process for the Improvement of Education. Englewood Cliffs, N.J.: Prentice-Hall, 1976.

13. Hart, M. "Competency-Based Education." J. Am. Dietet. A. 69:616, 1976.

14. Howard, V. A., and Schiller, S. R. "Competency-Based Education in a Career Mobility Program in Dietetics." J. Am. Dietet. A. 71:428, 1977.

15. Hughes, I. S. "Survey of Dietetic Graduates: 1970-1977." (Unpublished report) Michigan State University, 1978.

16. Infante, M. S. The Clinical Laboratory in Nursing Education. New York: John Wiley & Sons, 1975.

17. Kaufman, R. Education System Planning. Englewood Cliffs, N.J.: Prentice-Hall, 1972.

18. Lewis, M. N., and Beaudette, T. M. "Coordinated Education in Dietetics." J. Am. Dietet. A. 70:596, 1977.

19. Loyd, M., and Vaden, A. "Practitioners Identify Competencies for Entry-Level Generalist Dietitians." J. Am. Dietet. A. 71:510, 1977.

20. Miller, G. A. "A Study of the Effectiveness of Academic Preparation of Recent Home Economics Graduates as Related to Managerial Responsibilities, in the Food Service Industry." Unpublished Ph.D. dissertation, Michigan State University, 1959.

21. Miller, J. E. Cooperative Education Workbook for Foodservice/ Hospitality. Boston: CBI Publishers, 1979.

22. Mizer, D. A., and Porter, M. Food Preparation for the Professional. San Francisco: Canfield Press, 1978.

23. Mizer, D. A., and Porter, M. Learning to Cook Professionally. San Francisco: Canfield Press, 1978.

24. Powers, T. F. "The Controlled Field Experience: Integrating Theory and Practice," J. Hospitality Ed. 4:2, Winter 1980.

25. "Program of Work, Accomplishments, 1976-1977." J. Am. Dietet. A. 71:541, 1977.

26. Report of the Study Commission on Dietetics. The Profession of Dietetics. Am. Dietet. A., 1972.

27. Report of the Task Force on Competencies, Council on Educational Preparation, Am. Dietet. A., J. Am. Dietet. A. 73:281, 1978.

28. Schein, E. Professional Education. New York: McGraw-Hill, 1972.

29. Sharp, J. L. "The President's Report, The A.D.A. Year, 1977-1978." J. Am. Dietet. A. 73:548, 1978.

30. Smith, E. E., and Crusius, V. C. A Handbook on Quantity Food Management. Minneapolis: Burgess Publishers, 1970.

31. Tyler, R. Basic Principles of Curriculum and Instruction. Chicago: University of Chicago Press, 1949.

32. Watson, D. R. "Coordination of Classroom and Clinical Experience." J. Am. Dietet. A. 69:621, 1976.

33. Wenberg, B. G., et al. "Role Competency Based Dietetic Education." A Report of a Workshop Series, Michigan State University, 1974-1975.

34. Williams, G. A. "The Hospital Food Service Director: Essential Qualifications." Unpublished M.S. thesis, Michigan State University, 1974.

LIST OF REFERENCES

GENERAL REFERENCES

Chapman, A. "Career Education: A Must for Competency-Based Distributive Education." Business Education Form 33:25, 1979.

Elston, T. "Featuring: It Works! Competency-Based Instruction." Agricultural Education 51:204, 1979.

McGaghie, W. C. "Competency-Based Curriculum Development in Medical Education." Public Health Papers No. 68. Geneva, Switzerland: World Health Organization, 1979.

Rinke, W. J. "Competency-Based Education, A Review, Analysis, and Appraisal." J. Am. Dietet. A. 76:247, 1980.

Russell, E. "Identification and Analysis of Competency-Based Adult Vocational Education Programs." Final Report, R & D Series, No. 132. Columbus: Ohio State University, National Center for Research in Voc. Ed., January 1978.

Unklesbay, N., and Spears, M. C. "Attachment Learning: A Humanistic Educational Experience." J. Am Dietet. A. 67:449, 1975.