DOCUMENT RESUME

ED 108 714 JC 750 378

TITLE Modularization of Courses.
INSTITUTION Eastern Arizona Coll., Thatcher.
SPONS AGENCY Arizona State Dept. of Education, Phoenix. Div. of Vocational Education.
PUB DATE Mar 74
NOTE 70p.

EDRS PRICE MF-$0.76 HC-$3.32 PLUS POSTAGE
DESCRIPTORS Administrative Organization; Business Education; English Instruction; Flexible Scheduling; *Individualized Instruction; *Instructional Innovation; *Junior Colleges; *Programed Units; *Schedule Modules; Student Attitudes; Teacher Attitudes; Technical Education; Vocational Education
IDENTIFIERS *Eastern Arizona College

ABSTRACT

Eastern Arizona College has developed a modularized system of instruction for five vocational and vocationally related courses--Introduction to Business, Business Mathematics, English, Drafting, and Electronics. Each course is divided into independent segments of instruction and students have open-entry and exit options. This document reviews the processes utilized in selecting courses to be modularized, deciding on the instructional units for each course, and choosing the instructional methods to be used. Outlines of the modules for each course are presented, as are the pre- and post-testing procedures, comparisons of student achievement before and after the implementation of the modularized system, and student and faculty opinions of the new approach. Methods used for scheduling, registration, awarding credit, computing GPA, and meeting graduation requirements are also discussed. Conclusions based on the comparisons and opinions indicate that: (1) fewer units were awarded under the new approach; (2) modularization is more expensive in terms of equipment and instructor time; (3) modularization requires the instructor to work more closely with other departments in determining course content; and (4) students liked the ability to finish the course early, but they disliked the lack of teacher pressure in setting deadlines. Recommendations for improvement are made. (DC)

EASTERN ARIZONA COLLEGE

MODULARIZATION OF COURSES

FUNDED BY

ARIZONA DEPARTMENT OF EDUCATION
DIVISION OF CAREER AND VOCATIONAL EDUCATION

JESSE U. DE VANEY
PROJECT DIRECTOR

DR. DEAN A. CURTIS
PRESIDENT

DR. RALPH ORR
DEAN OF OCCUPATIONAL
EDUCATION

EASTERN ARIZONA COLLEGE
THATCHER, ARIZONA 85552

MARCH, 1974

ACKNOWLEDGEMENTS

Grateful acknowledgement is made for the grant received from the Exemplary Programs Unit, Department of Vocational Education, Arizona State Department of Education which made this project possible. An expression of thanks to the President of EAC, Dr. Dean A. Curtis, for his wholehearted support of this effort.

Of the many individuals who have cooperated to bring about the completion of this study, special and grateful acknowledgements for their perserverance and dedication are made to all of the participating faculty (listed below); the Dean of Occupational Education, Dr. Ralph Orr; and the Academic Dean, Wayne M. McGrath.

Members of the Project
(alphabetically)

Name	Position
Annamae Bogard	Business Instructor
Thomas Cobb	English Instructor
Jesse U. De Vaney	Project Director
Kent Hathaway	Electronics Instructor
Wayne M. McGrath	Academic Dean
Robert Nicholaisen	Drafting Instructor
Ralph Orr, PhD.	Dean of Occupational Education
Fenton Taylor	English Instructor
Ed Vergara	Business Instructor

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ABSTRACT

Students need methods whereby they can achieve their career goals in as short a period of time as is practical.

Through modularization (dividing a course into independent segments of instruction) Eastern Arizona College developed a method of instruction whereby students have open-entry and exit for five vocational and vocationally related courses -- Introduction to Business, Business Mathematics, English, Drafting, and Electronics.

Behavioral objectives, programmed instruction, etc., were used by the instructors to develop the individual modules within each course.

Methods were designed to schedule, register, award credit, and compute grade point average for the individual modules within each course.

Some of the general conclusions reached after the first semester of implementation were:

1. Fewer units were awarded under modularization than the instructional system used in 1972-73.
2. The quality of the work completed in the modules was higher than that achieved with the instructional system in 1972-73.
3. Generally, the students' reactions to modularization were mixed. The feeling that they could finish early was expressed most often as an advantage. However, the lack of teacher pressure was mentioned most frequently as a disadvantage.
4. The classroom management system is critical to the success of modularized instruction.

CHAPTER I

A. Introduction

To provide more meaningful educational experiences for students is one of the major problems facing community colleges. Arizona community colleges serve a population composed of many students with diverse cultural, social, and economic backgrounds.

The problem is compounded by the attempt to meet the varied needs of the high school graduate, the veteran, the handicapped, the unemployed, and adults seeking additional training. The present lock-step educational system does not provide for these varied needs.

Eastern Arizona College (hereafter referred to as EAC) had attempted, on an extremely limited scale, to break away from this traditional lock-step system and develop independent segments of courses through the use of behavioral objectives and programmed instruction. Results from the use of these independent segments indicated: (1) this method would help the student work at his own pace and (2) motivate him to complete his program by not requiring him to learn things he would not use on the job. In order to further develop and expand this approach, funds were sought and awarded through the Arizona Vocational Exemplary Program Section to develop and implement such a program.

B. Statement of the Problem

The present lock-step educational system does not provide for:

1. Students with diverse cultural, social, and economic backgrounds.

2. Students with varying degrees of ability and educational backgrounds.

3. Students with limited time to achieve their career goals.

In addition, the present system does not provide for awarding of credit for completing a portion of a course, uniformity of teacher expectation levels for student achievement, and a method allowing a student to take only material which will be appropriate to his career goal.

In an effort to achieve this goal, EAC proposes to study, develop, and implement, on a limited scale, a method (hereafter referred to as modularization) whereby students may take appropriate sections of a course (hereafter called modules) to fulfill their career goals.

C. Procedures

The project was divided into the four phases listed below:

1. Identification of ten first semester freshmen vocational and vocationally related courses which would be modularized in accordance with specific criteria. (See Chapter III, Para. 2)
2. Determination of the instructional units to be covered in each of these courses.
3. Selection and modularization of five courses from the above.
4. Implementation of the modularized courses into the instructional program.
5. Evaluation of the effectiveness of the modularized courses.

CHAPTER II

(Phase 1)

A. Selection of Possible Courses to be Modularized

1. Course Vocational Curricula Matrix

To determine the ten first semester vocational and vocationally related courses which could be modularized, a Course Vocational Curricula Matrix was developed from the catalog. The various vocational curricula were listed in columns across the top and the vocational and vocationally related courses listed down the left side (see Appendix A). The matrix also indicated the semester (fall or spring) each course was offered and the number of students enrolled during 1972-73. The symbol A_1 was used to indicate when a course was required in the first semester of a curriculum and E_1 indicated that there was an alternate course available depending upon the student's background and ability.

2. Criteria for Selection

From this matrix a list of those courses required in two or more curricula was prepared. (See Appendix B). From this list ten courses were selected to be sub-divided into small sequential units. The criteria used for this selection were the number of curricula involved, enrollment in the course, and number of semesters which the course was offered. Preference was given to those courses meeting these criteria.

3. Courses Selected

The ten courses selected were: BU 30 Introduction to Business; BU 35 Principles of Accounting; BU 38 Business Mathematics; BU 62 Introduction to Data Processing; IT 12 Technical Drawing; IT 15 General Metals; IT 07 Introductory Math; IT 26 Fundamentals of Electricity and Electronics; EN 01 Writing Fundamentals; and EN 02 Written Communications.

B. Selection of Instructional Units for Each Course

1. Individual Course Matrix

The instructors of these courses prepared a matrix for each selected course showing the instructional units down the left side of the matrix and the curricula in which it was recommended in columns across the top.

2. Utilization of Lay Advisory Committee

The department heads, and where possible the instructor, met with the appropriate lay advisory committees to determine which instructional units the students should receive. These units were checked on the matrix.

3. Completion of Matricies

As each matrix was completed, it was submitted to the project director (see Appendix C for a completed matrix). A study of the completed matrices indicated the following: (1) the ten courses could be practically divided into units of instruction normally lasting not less than four weeks nor more than twelve weeks,

(2) all were first semester freshmen courses and (3) they were common to two or more vocational curricula.

C. Conclusions for Phase 1

The course vocational curricula matrix revealed: (1) a large number of courses being utilized in only one curricula, (2) an overlap of identical material exists in several courses, (3) several of the prepared modules could be utilized by instructors in related courses. In addition, the matrix would be valuable in the development of class schedules and doing cost analysis of the various curricula.

Involvement of the lay advisory committees in determining the instructional units the students should receive proved to be informative to both the members of the committee and the department head. It is recommended that the committees should be involved in an analysis of this type for other courses.

CHAPTER III

(Phase 2)

A. Selection of Courses to be Modularized

1. Courses Selected

Five courses were chosen to be modularized from the list of ten courses prepared in Phase 1. The courses chosen were: BU 30 Introduction to Business; BU 38 Business Mathematics; IT 12 Principles of Drafting; IT 26 Fundamentals of Electronics and Electricity; EN 01 Writing Fundamentals; EN 02 Written Communications (two modules only).

2. Criteria for Selection

The criteria used for selecting the courses to be modularized were:

a. The courses normally taught both semesters.

b. The courses introductory in nature.

c. The courses recommended for students in their first semester in three or more vocational curricula.

d. The desire of the instructor to participate in the project.

Discovery of the fact that identical material was being taught in several courses led to the consideration of an additional factor, i.e. whether or not the course contained material being taught in another course.

B. Criteria for Preparation of Modules

1. General Criteria

As a result of several meetings with the instructors involved, the department heads, and the project director, a list was prepared of the general criteria that all of the modules would meet. These criteria were:

a. Behavioral objectives written for each segment of each module.

b. It be specified which segments are covered in each module.

c. Pre-test and post-test, based on the above behavioral objectives, be prepared for each module. In addition, criteria for interpretation of grades on the basis of test performance were determined.

d. Alternate methods of presentation were identified. These included, but were not limited to:

1. Tapes/slides
2. Tapes/film strips
3. Tapes/student text
4. Video tape
5. Live lecture--chalk board--overhead projector
6. One-to-one teaching during possible scheduled individual appointments.
7. Programming
8. Flow-charting

e. Each segment be designed so that a student working at his own pace (fast or slow) could retrieve it and use it as often as necessary.

f. The pre-requisites for modules in certain segments be specified as to content and performance level.

g. Justification be provided should there occur deviations from these criteria.

h. Appropriate materials be provided for the method of presentation chosen for each particular segment.

Due to the nature of the course, criterien "e" was not included in the two modules of English 02.

2. Individual Course Criteria

a. Criteria for BU 30 Introduction to Business.

1. Four modules as listed below:

MODULE 1

A. American Business and Our Economic System
B. Government Regulation and Taxation
C. Legal Environment and Business Ethics
D. The Management and Executive Leadership
E. Management and Executive Leadership
F. Internal Organization Structure
G. Accounting and Budgets
H. Research Statistics and Decision Making
I. Short-term Financing

MODULE II

A. Legal Forms of Business Ownership
B. Capital Financing
C. Information Management: Electronic Data Processing
D. Labor and American Business
E. Labor-Management and Insurance
F. Risk Management and Insurance
G. Advertising as Sales Promotion
H. Personal Selling and Sales Management

MODULE III

A. Small Business Enterprise
B. Manufacturing Facilities and Materials
C. Manufacturing Processes and Control
D. Marketing in Our Economy
E. Distribution Channels and Marketing Practices
F. Transportation and Physical Distribution
G. International Trade

MODULE IV - Programmed for students desiring to begin the course at any time and work independently.

A. American Business and Our Economic System
B. Government Regulation and Taxation
C. Legal Environment and Business Ethics
D. Management and Executive Leadership
E. Internal Organization Structure
F. Accounting and Budgets
G. Short-term Financing
H. Labor and American Business
I. The Management and Motivation of Personnel
J. Risk Management and Insurance

2. Each module be designed so that it is independent of the others--not sequential.
3. Each module be designed to accomodate three levels of instruction--
   (a) Students with sufficient background to proceed on their own,
   (b) Students needing some assistance,
   (c) Students needing in-depth assistance from the instructor.

At no time were students in the first two levels allowed to fall behind the group in the third level.

b. Criteria for BU 38 Business Mathematics

Five Modules will be prepared with emphasis as indicated below.

MODULE 1: Rapid Review of Basics

1. Segment 1

   a. Whole numbers
      1) addition
      2) subtraction
      3) multiplication
      4) division
   b. Verification methods
   c. Common fractions
      1) Proper, improper, complex
      2) reduction
      3) addition
      4) subtraction
      5) multiplication
      6) division
   d. Decimals
      1) Meaning of decimals
      2) addition
      3) subtraction
      4) multiplication
      5) division
   e. Aliquot parts
      1) Finding decimal equivalents of common fractions
      2) Finding common fraction equivalents of decimal fractions

2. Segment 2
   a. How to find unknown quantities by use of simple algebra.
   b. How to use percentages
   c. Applications of percentages
   d. Comparison by use of ratio

MODULE 1_r:
To be used by those students who do not make acceptable scores on M1. Will be a slow, intensive review of the basics in M1 starting at a much more elementary level.

MODULE 2:
Segment 1 - checking accounts
Segment 2 - Payroll
Segment 3 - Interest: Basic computation
Segment 4 - Interest: Consumer applications

MODULE 3:

- Segment 1 - Interest: Notes and Interest
- Segment 2 - The Balance Sheet and the Income Statement
- Segment 3 - Retailing Math, Part 1
  - a. Trade discounts
  - b. Cash discounts
  - c. Transportation charges
  - d. Sales commissions
- Segment 4 - Retailing Math, Part 2
  - a. Markup on cost
  - b. Markup on retail
  - c. Selling price
- Segment 5 - Methods of Retail Inventory
  - a. Estimation
  - b. Estimating future purchases
  - c. Turnover rates

MODULE 4:

- Segment 1 - Interest Notes and Interest
- Segment 2 - The Balance Sheet and the Income Statement
- Segment 3 - Methods of Retail Inventory
- Segment 4 - Depreciation Methods
  - a. Straight-line
  - b. Units-of-production
  - c. Declining Balance
  - d. Sum of the Years' Digits
  - e. Partial year calculations
- Segment 5 - Stocks and Bonds
  - a. Definitions
  - b. Discounts and premiums
  - c. Dividends
  - d. Rate of return

c. Criteria for EN 01 Writing Fundamentals and EN 02 Written Communications

1. Identify those areas in which the student is already proficient and eliminate the necessity of his working in these areas.

2. Enable the student to work at his own rate in those areas in which he is deficient.

3. Enable the instructor to devote more time to individual instruction.

4. Three modules for EN 01, Writing Fundamentals, will be prepared with emphasis as indicated.

MODULE 1

1. Patterns of the Simple Sentence
   - A. Pattern 1 noun-subject, verb-intransitive
   - B. Pattern 2 noun-subject, verb transitive, noun-direct object
   - C. Pattern 3a noun-subject, verb-transitive, noun indirect object, noun-direct object
   - D. Pattern 3b noun-subject, verb-transitive, noun-direct object, noun-object-complement
   - E. Pattern 4 noun-subject, linking verb, noun-subject-complement

2. Nouns
   - A. Count nouns
   - B. Mass nouns
   - C. Forming plurals
   - D. Noun gender

3. Verbs
   - A. Single verbs and verb phrases
   - B. Regular and irregular verbs
   - C. Troublesome verbs
   - D. Verb tense

4. Basic Modification
   - A. Use of single-word modification
   - B. The prepositional phrase

5. The Paragraph
   - A. Basic Concept
   - B. The topic sentence
   - C. Development of the idea

6. The Descriptive Theme
   A. Objectivity
   B. The use of detail
   C. Organization

MODULE 2

1. Coordination
   A. Compounding sentence parts
   B. Compounding simple sentences
   C. Punctuating with compounds
   D. Sentence errors with compounds

2. Pronouns
   A. Person, case and number
   B. Substituting pronouns for nouns
   C. Use of the third person pronoun
   D. Indefinite and demonstrative pronouns
   E. Pronoun reference
   F. Pronoun-Antecedent agreement

3. Subject-verb agreement

4. Subordination
   A. Adverbial clauses
   B. Comparison
   C. Adjective Clauses
   D. Noun clauses
   E. The fragment

5. The Illustration Theme
   A. Forming the thesis
   B. Development through examples

MODULE 3

1. Variations within Sentences
   A. Inversion
   B. Passive transformations
   C. Verbals
   D. Sentence revision

2. Punctuation and Capitalization

3. Polishing the Sentence
   A. Point of view
   B. Accurate diction
   C. Parallelism
   D. Editing the sentence

4. The Comparison--Contrast Theme
   A. Basic Organization
   B. The use of examples

5. The Process Analysis Theme
   A. Logical progression
   B. Definition and explanation

5. Two modules for EN 02, Written Communications, will be prepared with emphasis as indicated.

MODULE 1

1. Sentence Structure
   A. Sentence syntax
   B. Sentence expansion
   C. Concrete and specific sentences
   D. Rhetorical types of sentences

2. The Essay of Description
   A. Statements of fact
   B. Accurate observation
   C. Concreteness
   D. Spatial order
   E. Climactic order

3. Outlining
   A. The topic outline
   B. The sentence outline
   C. Relationship among parts
   D. Logical progression
   E. Completeness

4. The Essay of Illustration
   A. Restricting the subject
   B. The topic sentence
   C. Development by example
   D. Adequate support for generalizations

5. The Paragraph
   A. Unity
   B. Order
   C. Completeness
   D. Coherence

6. The Essay of Process Analysis
   A. Logical progression
   B. Defining
   C. Development through details
   D. Explaining

MODULE 2

1. The Essay of Comparison-Contrast
   A. Forming the Thesis
   B. The divided pattern of organization
   C. The alternating pattern of organization
   D. The conclusion as judgement
   E. The comparison-contrast outline

2. Special Paragraphs
   A. Introductory paragraphs
   B. Concluding paragraphs
   C. Transitional paragraphs

3. The Essay of Classification
   A. Basis for classification
   B. Organization of classification
   C. Consistency
   D. Development
   E. The classification outline

4. The Essay of Causal Analysis
   A. The cause-effect relationship
   B. Posing the problem
   C. Refutation
   D. Hypothesis
   E. Support
   F. The causal analysis outline

5. Revising the Essay
   A. Revision sentences
   B. Accurate diction
   C. Appropriate diction
   D. Conventional usage
   E. Conventional grammar
   F. Conventional punctuation
   G. Conventional spelling

d. Criteria for IT 12 Technical Drafting

1. The materials prepared for IT 12 would be designed so that they could also be used in It 10, Principles of Drafting.

2. Because of the special needs of the automotive technology student, two modules 4A and 4B will be designed to meet their graphical interpretation needs. These modules would be used in either IT 10 or a separate two unit course.

3. At the completion of each task the student's work is to be evaluated and the student informed as to his progress.

4. Each module will include the following items.

   a. Introduction
   b. Pre-test
   c. Content
   d. Post-test
   e. Text cross reference
   f. Check sheet - student and instructor

5. Four modules will be prepared with emphasis as indicated.

MODULE 1 - Basic Drawing Techniques
   1. Introduction
   2. Pre-test
   3. Use of tools
   4. Geometrical constructions
   5. Lettering
   6. Titleblock
   7. Drafting room practices

MODULE 2 - Basic graphical representation
   1. Technical sketching
   2. Isometric projection
   3. Two-view orthographic projection
   4. Basic dimensioning
   5. Two-view working drawings
   6. Three-view orghographic projection
   7. Three-view working drawings
   8. Pictorial drawings

MODULE 3 - Auxiliary Views and Sections

1. Sectioning
   a. Full
   b. Half
   c. Revolved
   d. Die
   e. Broken out
2. Full section with fastener representation
3. Auxiliary views
4. Working drawings involving sections and auxiliary views
5. Introduction to inking
   a. Use of pens in completing simple isometric
   b. Use of Leroy and lettering templates

MODULE 4A - Basic Graphical Interpretation

1. Introduction to blueprint reading
2. Drafting and blueprint reading procedures
3. Title block, materials, notes, and drawing changes
4. Machining specifications
5. Reading blueprints in specialized areas
6. Advances and achievement blueprings

MODULE 4B - Graphical Interpretation

1. Content of Module 3 except assignments are completed by sketching as opposed to the use of drafting instruments.
2. Content of Module 4A in its entirety.

e. Criteria for IT 26 Fundamentals of Electricity and Electronics

1. Each module will include the following items.

   a. Title
   b. Rationale
   c. Objective
   d. Pre-test
   e. Learning activity
   f. Post-test
   g. Quest

2. Five modules will be prepared with emphasis as indicated.

   MODULE 1 - DC Circuits and Test Instruments
   Segments:
   1. Introduction
   2. Science of Electronics
   3. Sources of Electricity
   4. Circuits and Power
   5. Instruments and Measurements
   6. Test Instruments

   MODULE 2 - AC Circuits, Transistors, and Tubes
   Segments:
   1. Introduction
   2. Inductance and RL Circuits
   3. Capacitance in Electrical Circuits
   4. Tuned RCL Circuits
   5. Transistors
   6. Tubes
   7. Power Supplies
   8. Amplifiers
   9. Radio Wave Detection
   10. Oscillators
   11. Television

   MODULE 3 - Electricity/Electronics for Drafting Majors
   Segments:
   1. Introduction
   2. Terms, Symbols and Codes
   3. House Plans
   4. Estimating Electrical Needs
   5. Wiring and the Tools Used

MODULE 4 - Electricity/Electronics for Automotive Majors

Segments:

1. Introduction
2. Automotive Uses of Electricity
3. Electronic Ignition
4. Electric Cars

MODULE 5 - Electricity/Electronics--General

Segments:

1. Introduction
2. Consumer Electronics
3. Electronics in Housing
4. Electronics in Autos
5. Electronics in Mining

CHAPTER IV

(Phase 3 and 4)

A. Administrative Procedures

Prior to the actual implementation of the courses, methods were needed for scheduling, registering, awarding of credit. computing grade point average, and meeting graduation requirements.

1. Scheduling

The modularized courses were listed both as individual courses and as separate one unit classes.

2. Awarding of Credit

Because the modules were designed to be completed in approximately five weeks, one unit of credit was awarded for a completed module.

3. Registration

The student and his advisor decided whether or not the student was to enroll for the entire course or for separate modules. When in doubt, the student was advised to register for all three modules. Provisions were made for changes in registration during the semester.

It was found during the semester that it would be simpler to show students who were enrolled for the complete course as enrolled in each separate module. This change was made in all but BU 30, Introduction to Business.

4. Computing Grade Point Average

Awarding one unit of credit for each module simplified the

problem of computing grade point average. This technique enabled the Records Office to compute grade point average as before. In the case of BU 30, the grades for the three modules were averaged to arrive at a final grade for the course..

5. Graduation Requirements

Students needing only one or two modules of a course may petition the Admission and Academic Standards Committee to have the remaining modules of the course waived for graduation purposes. To receive the Associate in Arts or Associate in Applied Science degree, the student would still need to complete 64 units.

B. Course Implementation and Evaluation

For the convenience of the reader, the implementation and evaluation phases of the individual courses are combined. The grading system used at EAC is A, B, C, D, I (Incomplete), and W (Withdrew). Because the W doesn't clearly identify whether the student stayed in the course or dropped out during the semester, no statistical comparison is possible.

1. Introduction to Business, BU 30

a. Pre-Test

All students were given a pre-test covering the first module. Those scoring 80% or better received credit for the module and took the pre-test for the next module. This continued until the student either successfully passed the three pre-tests and received credit for the course or failed to score 80% or better.

b. Class Procedures

The students who did not score high enough (80% or better) on the pre-test were required to come to class through the first sub-test in the module. If the student scored 80% or higher on the sub-test, he could work independently of the class and either take the next sub-test early or continue with the class. However, any student working on the same portion of the module as the class was required to take the sub-test either with the class or earlier. Those making less than 80% on the sub-test were also required to attend class. To raise their grades, students were allowed to retake tests (using another form of the test) one time.

c. Results

Units Passed. Table 1 shows a comparison of units passed during the first semester 73-74 with the same semester of 72-73.

Table 1

Comparison of First Semester
Units Passed

	72-73	73-74
Total starting course	88	70
Completing 1st Module		55
Completing 2nd Module		55
Completing 3rd Module		52
Completing Course	66	52
Units Awarded	198	162

Approximately the same percentage of students passed all three modules as passed the course under the method used in 1972-73.

Grade Distribution. Table 2 is a comparison of the grade distribution between the first semester of 1972-73 and first semester of 1973-74.

Table 2

Comparison of First Semester
Grade Distributions

	72-73	73-74		
		Module 1	Module 11	Module 111
A	12	9	9	9
B	7	13	13	13
C	35	23	23	21
D	12	10	10	9
W	22	16	16	19

Early Course Completions. Five students completed the course at least six weeks early. Two were through by the end of eight weeks. After Module 2, three students decided to withdraw and start a business of their own. Two secretarial students that only needed two modules stayed for the third module as a one hour elective because they enjoyed the class.

Drop Out Rate. Because the W doesn't clearly identify whether the students stayed in the course or dropped out during the semester, no statistical comparison is possible.

Student Evaluation. The students were surveyed to obtain their opinions concerning the modularization of this course. The advantages and disadvantages as seen by the student are listed below.

Advantages listed by the student included appreciation for the opportunity to:

1. Take a pre-test for each module.
2. Complete the course in less time than the traditional semester. (Five students completed the course early.)
3. Work independently outside of class.
4. Re-take low score tests.
5. Do many extra credit activities.

The major disadvantage listed by the students was that students scoring less than 80% had to attend class.

Student Comments. A number of minority students commented favorable on the sense of achievement they had. Specifically, they liked the chance to retake a test, obtain a higher score, and gain more knowledge of the material covered.

Instructor Evaluation. Advantages:

1. Increased opportunity to know and to help individual students.
2. Geared the class instruction and activities around a certain catagory of students (those that scored 80% or more and those that scored 80% or less on tests).
3. Employed a greater variety of teaching methods.
4. Made better use of the Learning Resource Center.
5. Helped most students complete and obtain at least one hour of credit.

Disadvantages:

1. More time was required of the instructor in keeping track of and correcting student assignments.
2. Not having the brighter students in class to participate in class discussions and projects.
3. A few students who were kept in class felt punished.

d. Conclusions

1. Modularization enables the instructor to give more personal attention to each student.
2. This approach enabled the instructor to more clearly identify the specific difficulty the student had

encountered and devise ways appropriate to the individual student to overcome the problem

e. Recommendations

There are no recommendations at this time.

f. Preliminary Report for Second Semester

1. No students receiving a W the first semester enrolled for the second semester.
2. Preliminary monitoring indicates that approximately 90% of the class will complete the first module on time. Last semester approximately 21% failed to complete this module.

2. Business Mathematics, BU 38

a. Pre-Test

Students were given a pre-test to determine whether they would start with module M or M_{1R}. This test consisted of simple arithmetic operations, fractions, decimals, and percentages. The results are shown in Table 3.

Table 3

Results of Pre-Test

Score	No. of Student	% of Student
19% or below	12	21
20% to 39%	13	23
40% to 59%	17	30
60% to 79%	3	
80% to 100%	1	
Wanted to start with Remedial	10	18

The cut off score of M_1 was approximately 40% to 59%. Thus, 46 students did not have sufficient mathematical background to succeed in the regular college level Business Math and were placed in the remedial Module M_{1R} to acquire to necessary background.

b. Class Procedures

After assigning the students to the appropriate module, students were encouraged to proceed at their own pace and to feel free to ask the instructor for help when needed. The emphasis was on accomplishment rather than grades and attendance.

To reinforce the student's accomplishment, an answer key was available for the student to check his own homework as soon

as he finished. Homework was not handed in, thus eliminating the problem of students just copying the key. The homework problems were used to teach the student the necessary mathematical functions for that module and to enable him to judge when he was ready for the module tests.

Again, to reinforce the idea of accomplishment, the test was graded while the student watched. A diagnosis of his mistake was made and the student required to rework the problems he missed while they were fresh in his mind.

Due to errors in both the test and answer key, many of the A-V materials prepared could not be used. An attempt was made to rectify the situation, but it became obvious that all of the corrections could not be made during the school year.

c. Results

Units Passed. Table 4 shows a comparison of units passed during the first semester 73-74 with the same semester of 72-73.

Table 4

Comparison of First Semester Units Passed

	1972	1973
Total starting course	62	52
Completing 1st Module		23
Completing 2nd Module		9
Completing 3rd Module		3
Completing Course	31	3
Units Awarded	93	35

The modularization system resulted in a decrease in the number of units passed.

Grade Distribution. Table 5 is a comparison of the grade distribution between the first semester 73-74 and the first semester 72-73.

Table 5

Comparison of First Semester Grade Distribution

Grades	1972 Entire Course	1973 Module 1	1973 Module 2	1973 Module 3
A (90-100%)	5	8	7	2
B (80-89%)	11	7	1	0
C (70-79%)	15	7	1	0
D (50-69%)	0	1	0	0
W	31	29	42	47

Dropout Rate. Because the W doesn't clearly identify whether the student stayed in the course or dropped out during the semester, no statistical comparison is possible.

Student Comments. Generally, the comments of the students were favorable for modularization. Understanding of mathematics for the first time and relief from the pressure of having to move at a pre-determined pace were typical student comments. In addition, the counselors reported that the students liked the self-paced courses.

Student Evaluation. Advantages:

1. Student can proceed at his own pace, however rapid or slow it might be.
2. Student can spend less time on material in which he is competent and more on material which he finds more difficult.
3. Student can ask for and receive individual help and explanation from the instructor at the time that

particular help is needed.

4. Student can take exams when he is ready. The trauma of forcing an unprepared student in an exam is avoided.
5. Student can take a second exam on the material if necessary to his own demonstration of improved competency.
6. Student can, if necessary, continue into succeeding semesters without having to start at ground zero every time.

Disadvantages:

1. Students, like most of the rest of us, have a high enertial factor, and unless possessed of high motivation, tend to put off doing the work under a no-penalty system. Most have little or no aptitude for self-pacing. This seems particularly true of the students of below-average ability in mathematics.
2. Some students seem shy about asking for instructor help, even when it involves no public embarrassment. But this is true in any class format.

Instructor Evaluation. Advantages for the Teacher:

1. The whole course is totally planned and all assignments and exams made before the course even begins.
2. The teacher is enabled to spend far more time with the student to give him individual help.

3. The work load is very even with some students taking exams each day, but not all students on any one day. I've found that in most every case, I've the time right then to grade the exam while the student watches, diagnose his mistakes for him, and send him back to rework the problems he missed while they are fresh in his mind.
4. The students do their homework problems, then they themselves check their work against the answer key available, and make necessary corrections. This eliminates grading great piles of homework while providing the student with feedback when he needs it. Students on the whole, almost without exception, are conscientious about doing their homework and self-checking it, realizing that without their doing it, they cannot pass the exams. Since they do not hand in the homework, no brownie points are to be gained by copying the key.

Disadvantages:

1. The teacher does not get the sense of "accomplishment" derived from finishing off a whole class at the end of the semester (whether they know the material or not).
2. The teacher must have total instant mental recall of each type of procedure and problem in the whole course,

retrievable upon student demand. No teacher should attempt this technique unless he has been through the course several times already.

d. Conclusions

A. The number of units awarded was not as great as hoped for. The reasons for this are enumerated below.

1. The students taking Business Math were poorly prepared and had little self-motivation. The pre-test indicated that 36% of the class could not do one or more of the very basic arithmetic operations of addition, subtraction, multiplication, or division. Approximately 88% were unable to do fractions, decimals, and percentages satisfactorily. Of the remaining 12%, an additional 8% needed an in-depth review of these functions leaving approximately 4% of the class ready to enter Business Math on the college level. One might surmise that the dislike of math expressed by many of these students was due to previous unsuccessful experiences in this area.
2. The errors contained in the text negated the effectiveness of the prepared audio-visual material.
3. The progress of many students was hampered because of the difficulty of the text.

4. Most of the students had little or no aptitude for self-pacing.

5. Compared to the previous system, a higher level of competence was required on basic skills before being allowed to progress to Modules 2 and 3.

B. The use of behavioral objectives closely tied to the examinations was useful in focusing student attention and seemed to diminish his fear of the examinations.

C. Unlimited self-pacing was not practical.

D. Conducting of two or more levels of instruction simultaneously using modularization was practical.

e. Recommendations.

1. If the student is expected to complete the course in one semester, there should be a pre-requisite of demonstrated basic computational skills.

2. Dependent on the student's ability, a time sequence for for completion of the various sub-tests should be established for each individual student.

3. A system of record keeping on individual cards should be set up to keep a record of each student's progress. These should be retained for several years so that when the unfinished student reappears in the course, he can pick up where he left off.

4. The teacher should avoid the temptation to explain too much to the student who asks a question. Listen carefully

to just what is being asked; answer that; don't try to tell the student everything known.

5. The teacher should be able to handle a high level of variables with calm, hanging loose and not getting pushed. Make each student receiving help feel that he has all of the teacher's time that he needs.
6. Encourage student-peer tutoring in some sort of informal buddy system. Often, another student can see the hang-up easier than the teacher.
7. Never start this system until you've lived with the text once through or have gone over it painstakingly for any built-in errors.

f. Changes to be made for second semester:

1. Pacing calendars will be distributed to students indicating the progress they should make by certain dates if they hope to complete their objective.
2. Pacing reminders will be written on the blackboard each class period.
3. Deadlines will be set after which tests become "unavailable." In practice, deadlines will be flexible to individual circumstance.

g. Preliminary Report for Second Semester Enrollment. Table 6 shows the number of students from the first semester who have signed up for the second semester.

Table 6

No. of Students Re-enrolled
for 2nd Semester

	W's	Signed Up				
		M 1-2	M 1-3	M 2-3	Mod 3	Total
Modular 1	29	1	12			13
Modular 2	42	1	12	4		17
Modular 3	47		12	4	5	21

Student Progress. Early monitoring reports indicate that the modification of the pacing system instituted for the second semeste. ems to be helping.

3. Writing Fundamentals, EN 01

a. Pre-Test

All students were given a pre-test covering the first module. Those scoring 90% or better received credit for the module and took the pre-test for the next module. This continued until the student either successfully passed the three pre-tests and received credit for the course or failed to score 90% or better.

b. Class Procedures

The student worked from the text, Commanding Communication, on his own, asking for assistance when he needed it. As he finished each of the nine units of the text, the student took a test on that unit. If he achieved a score of 85% or better, he was allowed to go on to the next unit. If the student's score was below 85%, the instructor went over the test with him, pointing out his mistakes, explaining the correct answers and indicating areas in which the student needed more study. After the student re-studied the material, he was given an alternate form of the test, usually passing on the second try; the student was allowed, however, to retake the test as often as necessary until he achieved the 85% score. Students were also allowed to retake tests to improve their scores, though few took advantage of this.

Attendance was kept by means of individual sign in/sign out sheets kept in a notebook at the instructor's desk. Upon entering the classroom, the student initialed the proper date

and indicated the chapter in the text that he was working on, and upon leaving the class the student indicated the chapter he was working on when he left. This provided the instructor with three things: a record of attendance, an indication of how much work was being done in class, and how much was being done outside of class.

In two of the four classes, there were over 25 students. In these classes a student assistant who had already completed the course was used to help check tests and answer student questions. This proved extremely helpful as there was often too much for one person to do in one hour. It was found helpful to grade tests and get them back to the student immediately, so often the student assistant did this while the instructor helped students who were having difficulties.

c. Results.

Units Passed. Table 7 shows a comparison of units passed during the first semester 73-74 with the same semester 72-73.

Table 7

Comparison of First Semester
Units Passed

	1972-73	1973-74
Total starting course	72	90
Completing 1st Module		64
Completing 2nd Module		47
Completing 3rd Module		21
Completing Course	45	21
Units Awarded	135 (62%)	132 (49%)

A lower percent of units were awarded under modularization than under the method used in 1972-73.

Grade Distribution. Table 8 is a comparison of the grade distribution between the first semester 1972-73 and the first semester of 1973-74.

Table 8

Comparison of First Semester Grade Distribution

	1972-73	1973-74		
		Mod 1	Mod 2	Mod 3
A	2	7	12	11
B	21	50	34	10
C	21	7	1	0
D	1	--	--	--
I	11	11	16	13
W	16	15	27	56

Those students completing a module did attain a higher level of proficiency than under the system used in 1972-73.

Early Course Completions. Eleven percent of the students completed the course at least one week before semester's end. This ranged from a student completing the course in two weeks to those finishing one week before the end of the semester.

Drop Out Rate. Though it is difficult to determine the exact meaning of the W, a comparison was made between the W's assigned in 72-73 and 73-74. It was found that approximately 21% of the W's awarded in 73-74 designated second or third modules not begun by students. Only 15% of the W's awarded indicated no credit or actual withdrawals.

Since the actual percentage of students withdrawing or receiving no credit was 15% as opposed to 22% in 72-73, this represents a 7% decrease in students receiving no credit.

Three percent of the students receiving W's registered for the course but failed to attend even one class.

Student Evaluation. The students were surveyed to obtain their opinions concerning the modularization of this course. It was noted that there was a discrepancy in their evaluation. On the one hand they wanted the opportunity to take tests when they felt they were ready; on the other hand, they wanted the instructor to provide controls so that they would not fall behind. The advantages and disadvantages as seen by the students are listed below. Advantages:

The students appreciated the opportunity to:

1. Take the tests when they were ready rather than on a specific schedule.
2. Finish the course early.
3. Receive more personal help from the instructor.

Disadvantages:

The students expressed the lack of:

1. Variety in the course.
2. Controls provided by the instructor.

Instructor Evaluation. Advantages:

1. A higher performance level was achieved by those students completing a module.
2. There was a smaller drop out rate.
3. Students with the ability and/or desire were able to complete the course early.

Disadvantages:

1. The students were generally unable to pace themselves.
2. Modularization puts greater demands on the instructor.

d. Conclusions

1. The number of units awarded was not as great as hoped for.
2. Unlimited self-pacing was not practical.
3. Conducting of two or more levels of instruction simultaneously using modularization was practical.

e. Changes Made

1. A suggested time sequence was provided the students which, if followed, would enable them to finish the course two weeks early.
2. The writing assignments were reduced, and an attempt was made to tie them more directly to the text.

f. Preliminary Report for Second Semester Re-enrolled Students. Table 9 shows the number of students who received W's at the end of the first semester and the number who re-enrolled to complete these modules.

Table 9

No. of Students Re-enrolled for Second Semester

	Received W's 1st Semester	Re-enrolled 1st Semester
Module 1	15	7
Module 2	27	13
Module 3	56	31

Progress Report. Preliminary monitoring during the first five weeks of the semester indicates a much higher percentage of students are on schedule and should be able to complete all work by the end of the semester.

4. Principles of Drafting, DR 10

a. Pre-Test and Post-Tests

Pre-tests and post-tests were developed and administered for all modules. All tests were evaluated by the instructor and in addition Module 2 tests will be evaluated by the Drafting Lay Advisory Committee in March 1974.

b. Class Procedures

The material used were Modules 1, 2 and 3 prepared by the instructor in the spring of 1972-73 supplemented by a textbook. Each module was divided into several units of instruction with progression from unit to unit accomplished at the student's individual pace. Each module had a goal statement defined in the introduction and each unit and sub-unit had goal statements provided in the form of performance objectives.

A student-instructor check sheet was developed for use in each module. When beginning a module, the student retained one copy of this check sheet and gave the second copy to the instructor. As the student proceeded through the module, the instructor would OK or grade each sub-unit on each copy as indicated on the check sheets and tell the student whether or not he could proceed to the next step. This process accomplished two management goals. First, the student and instructor knew where he was in the course at any point in time. Second, the method required intimate student-instructor contact in that

the student could not proceed until the previous step in the instructional sequence was signed by the instructor. This relationship required the instructor to meet personally with the student on a one-to-one basis at 41 points throughout the learning experience.

c. Results

Units Passed. Table 10 shows a comparison of units passed during the first semester 72-73 with the first semester 73-74.

Table 10

Comparison of First Semester Units Passed

	72-73	73-74
Total starting course	19	23
Completing 1st Module		19
Completing 2nd Module		12
Completing 3rd Module		0
Completing Course	13	0
Units Awarded	39	31

Grade Distribution. Table 11 is a comparison of the grade distribution between the first semester 72-73 and first semester 73-74.

Table 11

Comparison of First Semester Grade Distribution

Grades	72-73 Entire Course	73-74 Mod 1	Mod 2	Mod 3
A	2	7	3	-
B	5	12	8	-
C	5	-	1	-
D	1	-	-	-
I	-	-	7	5
W	6	4	4	18

Dropout Rate. Because the W doesn't clearly identify whether the student stayed in the course or dropped out during the semester, no statistical comparison is possible. However, registration for the second semester indicates that 13 out of 18 have enrolled for the remaining modules.

Attendance. Table 12 shows that attendance increased significantly while withdrawals were about the same. Twenty percent of the class had no unexcused absences.

Table 12

Days Absent During Semester

Number of Absences	72-73	73-74
0	0	20.0%
1-3	33.3%	61.0%
4-6	22.2%	13.0%
7-9	16.7%	4.4%
10-12	5.7%	4.4%
13 or more	5.7%	0

Student Evaluation. At the conclusion of the fall semester 73, a survey was made which reflected student opinion of the module instruction in drafting as compared to traditional methods.

Of 15 students surveyed, 11 felt they preferred taking a modular course and would choose this type rather than a course taught by traditional methods.

All students felt there were advantages and disadvantages to modular instruction with opinions falling into the following general catagories (direct student quotes):

Advantages:

1. "Work at your own speed."
2. "Helps me get more out of the course."
3. "Encourages self-discipline."
4. "Student can finish early."

Disadvantages:

1. "Causes student to slack off until behind."
2. "If student doesn't know how to study, he's in trouble."
3. "Not enough time given."
4. "There are too many assignments."

Instructor Evaluation.

1. Student Attitude.

   As compared to the fall class of 72, this group seemed to show greater motivation. The division chairman, as well as the instructor, felt that the classroom atmosphere was better (going directly to work, less horseplay generally, etc.)

2. Level of Proficiency at the end of the course.

   It was determined subjectively by visual evaluation of finished drawings that the module students produced higher quality work than the fall class of 72. This may be due to a higher level of proficiency required in the modular approach or that the students themselves were more prepared prior to enrolling in the course.

d. Conclusions

1. Fewer units were completed under modularization. Apparent reasons for non-completion were:
   a. Materials prepared contained too many assignments for a one semester course. Research other than at EAC has shown non-completion to be characteristic of self-paced instructional programs. The advantage to an EAC student is that he can earn 1, 2, or 3 units of credit compared to other schools which grant no units for non-completion of all material.
   b. The level of proficiency expected was higher. A "C" grade was required before the student could continue. Although this slows a student, it was though that at completion he would be better trained to secure and maintain employment.
2. The level of proficiency and attendance requirements were realistic.
3. The student was better prepared vocationally using the module materials.
4. Open entry-open exit for this course is feasible. However, this concept cannot be fully recognized until administrative problems beyond the control of the college are resolved.

5. An effective classroom management system, which is critical to the success of this type of instruction, was developed.

e. Recommendations

1. The instructional materials must be reduced in content.
2. Because of the reading necessary, reading scores should be required of each student before entry into a module course.

f. Changes to be made for Second Semester Re-enrolled Students. Table 13 shows the number of students who received W's at the end of the first semester and the number who re-enrolled to complete these modules.

Table 13

Number of Students Re-enrolled for Second Semester

	Received W's or I's 1st Semester	Re-enrolled 2nd Semester
Module 1	4	0
Module 2	11	3
Module 3	23	13

Student Progress. Students are progressing at the same rate as first semester. It is anticipated their rate of progress will increase over the first semester as they reach the sections which have been reduced in content.

5. Fundamentals of Electricity and Electronics, IT 26

a. Pre-Test

Each module was divided into several segments. Students were given a pre-test on each segment. Those scoring at least 80%were given the options of (1) receiving a C grade for the segment and proceeding to the next pre-test or (2) doing

or two "quests" (extra credit activity) to receive a B or an A grade respectively. Students scoring le's than 80% were required to do the learning acitvity.

b. Class Procedures

First half of semester. Unlimited self-pacing was initiated during the first half of the semester. Students were assigned time for discussions of problems with the instructor. They were allowed to proceed at their own rate and only required to come to the laboratory periods. Extremely limited progress was made with this system.

Second half of semester. Because of the poor results, students were put on definite schedules, required to attend all class sessions, and small group discussions held to assist students working on similar segments. In other words, a much more rigid control system was adopted and students began to progress.

c. Results

Units Passed. Table 14 shows a comparison of units passed during the first semester 73-74 with the same semester of 72-73.

Table 14

Comparison of First Semester Units Passed

	72-73	73-74
Total starting course	14	14
Completing 1st module		10
Completing 2nd module		1
Completing 3rd module		1
Completing course	13	
Units awarded	39	12

A much lower percent of units were awarded under modularization than under the method used in 72-73.

Grade Distribution. Table 15 is a comparison of the grade distribution between the first semester of 72-73 and first semester of 73-74.

Table 15

Comparison of First Semester Grade Distribution

	72-73	73-74		
		Module 1	Module 2	Module 3
A	2	1	0	0
B	4	7	0	0
C	7	2	1	1
D	0	0	0	0
W	1	4	13	13

Early Course Completions. There were no early course completions.

Drop Out Rate. Because the W doesn't clearly identify whether the students stayed in the course or dropped out during the semester, no statistical comparison is possible.

Student Evaluation. The students were surveyed to obtain their opinions concerning the modularization of this course. Generally, the students stated that the segments were too [illegible]d and expressed

a need for formal lecture/demonstrations. The most frequently listed advantage was that the student was free to learn what he wanted. In comparison, the most frequently mentioned disadvantage was the students' inability to pace themselves.

Instructor Evaluation. Advantages:

1. The system provides a means (with close instructor supervision) whereby student progress can be matched with the individual ability and need of the student.
2. The instructor must work more closely with the individual departments regarding the content of instructional units.
3. More students can be served with the same amount of laboratory equipment.

Disadvantages:

1. The instructor must have "instant" recall of all segments of the course.
2. Inability of students to pace themselves.

d. Conclusions

1. Students cannot pace themselves to finish by the end of the semester.
2. The increase in course content was not realistic.
3. Many students did not have proficiency in the basic knowledge for success in this course.
4. Students did better when working in small groups rather than individually. This grouping also assisted

the instructor in discussing the problems students were encountering.

e. Recommendations

1. Fixed time limits be established for the completion of segments and modules.
2. The course content be reduced to that covered in previous semesters.
3. Students should be required to demonstrate their proficiency in the basic knowledge needed for success in this course.
4. Students be grouped, in so far as possible, according to their abilities and interests.

f. Changes Made

1. The modules were shortened.
2. Regular check points and interviews were established for each student.
3. More stress was placed on attendance.
4. Papers were graded and returned to the students immediately.

g. Preliminary Report for Second Semester

Re-enrolled students. Table 16 shows the number of students who received W's at the end of the first semester and the number who re-enrolled to complete these modules.

Table 16

No. of Students Re-enrolled
for Second Semester

	Received W's 1st Semester	Re-enrolled 2nd Semester
Module 1	4	1
Module 2	13	5
Module 3	13	5

Progress Report. Preliminary monitoring during the first five weeks of the semester indicates a much higher percent of students are on schedule. Approximately 25% of the new students are ahead of schedule and may finish the course before the end of the semester.

CHAPTER V

A. General Conclusions

1. Fewer units were awarded under modularization than the instructional system used in 72-73.
2. Two or more semesters are needed to properly evaluate the true impact of modularization.
3. Modularization requires more individualized instruction and consequently more of the instructor's time.
4. Unlimited self-pacing is not practical for most students at EAC. They feel more comfortable with deadlines set by the instructor.
5. Modularization requires the instructor to work more closely with other departments in determining course content.
6. Modularization is more expensive than the regular type of instruction--increased initial cost and increased instructor load. However, in some courses, more students can be accomodated with the same amount of equipment.
7. Generally, the students' reactions to modularization were mixed. The feeling that they could finish early was expressed most often as an advantage. However, the lack of teacher pressure was mentioned most frequently as a disadvantage.
8. A comparison between the course content and required proficiency levels shows that in most of the modularized courses these items were higher than those required in 72-73.
9. The classroom management system is critical to the success of modularized instruction.

B. General Recommendations

1. Where applicable, basic skills and/or knowledge necessary for success in a course should be determined and a demonstrated proficiency required before a student is allowed in the course.
2. Remedial courses be provided in all needed areas so that students can obtain the basic skills and/or knowledge prerequisite to community college level courses.
3. In the modularized courses, course content and proficiency levels be reviewed and where applicable adjustments be made.
4. "Deadlines" be established and applied flexibly to assist the student in pacing himself.
5. In those modularized courses requiring an increased amount of the instructor's time, a sufficient amount of student assistance be provided.

A_1 = 1st Semester Requirements
E_1 = Alternate Courses Avail.

COURSE	AG01	AG10	AG59	AR06	BI76	BU15	BU30	BU35	BU38
OFFERED Fall	X	X	X	X	X	X	X	X	X
OFFERED Spring						X	X	X	X
ENROLLMENT Fall	19	21	9	22	47	38	87	42	43
ENROLLMENT Spring						30	17	17	44
ENROLLMENT Total	19	21	9	22	47	68	104	59	87
04 Agri-Business	A1	A1	A1				A1		
05 Production Agriculture	A1	A1							
06 Diesel Technology									A1
07 Auto Business							A1		A1
09 Automotive Service Technology									E1
10 Automotive Mechanics (1 Year)									E1
12 Drafting Technology									
13 Drafting (1 Year)									
14 Fashion Merchandising				A-1			A1		
15 General Business							A1		A1
16 Hotel-Motel Management						E1	A1	E1	
18 General Clerical (1 Year)						E1	A1	E1	A1
19 Office Services									A1
20 Secretarial							A1		A1
21 Law Enforcement									
22 Data Processing							A1	A1	
23 Police Secretary							A1		A1
24 Medical Secretary (1 Year)					A1		A1		A1
25 Stenographic (1 Year)						E1	A1	E1	A1
26 Legal Secretary							A1		A1
27 Mid-Management						E1	A1	E1	A1
28 Mechanical Engr. Technology									
29 Electronics Engr. Technology									
30 General Curriculum									
31 Machine Practices (1 Year)									A1
32 Electronics Service Technology (1 Year)									
35 Homemaking-Business									A1
36 Registered Nurse					A1				
40 Home Economics				A1					A1
41 Personal & Family Home Management									
42 Child Care Assistant				A1					
45 Mining Technology									
46 Technical Report Writing									
Bilingual Secretary							A1		A1

A_1 = 1st Semester Requirements
E_1 = Alternate Courses Avail.

COURSE	OFFERED Fall	OFFERED Spring	ENROLLMENT Fall	ENROLLMENT Spring	ENROLLMENT Total		BU42	BU44	BU47	BU48	BU49	BU54	BU60	BI62	CH01	CH21	CH27
BU42	X		29		29												
BU44	X	X	53	24	77												
BU47	X	X	23	11	34												
BU48	X	X	8	11	19												
BU49	X	X	8	10	18												
BU54	X		21		21	04	Agri-Business					A1					
BU60	X		0		0	05	Production Agriculture								E1	E1	
BI62	X	X	12	32	44	06	Diesel Technology										
CH01	X	X	37		37	07	Auto Business	E1									
CH21	X	X		44	44	09	Automotive Service Technology										
CH27	X		36		36	10	Automotive Mechanics (1 Year)										
						12	Drafting Technology										
						13	Drafting (1 Year)										
						14	Fashion Merchandising					A1					
						15	General Business										
						16	Hotel-Motel Management					A1					
						18	General Clerical (1 Year)	A1									
						19	Office Services	A1						A1			
						20	Secretarial	A1	E1	E1	E1	E1		A1			
						21	Law Enforcement										
						22	Data Processing						A1	A1			
						23	Police Secretary	A1	E1	E1	E1	E1		A1			
						24	Medical Secretary (1 Year)	A1	E1	E1	E1	E1		A1			
						25	Stenographic (1 Year)	A1				A1					
						26	Legal Secretary	A1	E1	E1	E1	E1		A1			
						27	Mid-Management						A1				
						28	Mechanical Engr. Technology										
						29	Electronics Engr. Technology										
						30	General Curriculum										
						31	Machine Practices (1 Year)										
						32	Electronics Service Technology (1 Year)										
						35	Homemaking-Business										
						36	Registered Nurse										
						40	Home Economics										
						41	Personal & Family Home Management										
						42	Child Care Assistant										
						45	Mining Technology								E1	E1	E1
						46	Technical Report Writing										
							Bilingual Secretary			E1	E1			A1			

A_1 = 1st Semester Requirements
E_1 = Alternate Courses Avail.

COURSE	OFFERED Fall	OFFERED Spring	ENROLLMENT Fall	ENROLLMENT Spring	ENROLLMENT Total
EN01	X	X	65	27	92
EN02	X	X	271	98	369
FL10	X	X	7	15	22
FL11	X	X	4	8	12
FL60	X	X	13	3	16
FL61	X	X		6	6
GL01	X		18		18
HP90	X	X	56	41	97

Curriculum	EN01	EN02	FL10	FL11	FL60	FL61	GL01	HP90
04 Agri-Business		A1						
05 Production Agriculture		A1						
06 Diesel Technology								
07 Auto Business	A1	A1						
09 Automotive Service Technology	A1	A1						
10 Automotive Mechanics (1 Year)								
12 Drafting Technology		A1						
13 Drafting (1 Year)								
14 Fashion Merchandising		A1						
15 General Business		A1						
16 Hotel-Motel Management		A1						
18 General Clerical (1 Year)		A1						
19 Office Services		A1						
20 Secretarial		A1						
21 Law Enforcement		A1						
22 Data Processing		A1						
23 Police Secretary		A1						
24 Medical Secretary (1 Year)		A1						
25 Stenographic (1 Year)		A1						
26 Legal Secretary		A1						
27 Mid-Management		A1						
28 Mechanical Engr. Technology		A1						
29 Electronics Engr. Technology		A1						
30 General Curriculum								
31 Machine Practices (1 Year)								
32 Electronics Service Technology (1 Year)								
35 Homemaking-Business		A1						
36 Registered Nurse								A1
40 Home Economics		A1						
41 Personal & Family Home Management								
42 Child Care Assistant		A1						
45 Mining Technology		A1					A1	
46 Technical Report Writing		A1						
Bilingual Secretary		A1	E1	E1	E1	E1		

A_1 = 1st Semester Requirements
E_1 = Alternate Courses Avail.

COURSE	OFFERED Fall	OFFERED Spring	ENROLLMENT Fall	ENROLLMENT Spring	ENROLLMENT Total	04 Agri-Business	05 Production Agriculture	06 Diesel Technology	07 Auto Business	09 Automotive Service Technology	10 Automotive Mechanics (1 Year)	12 Drafting Technology	13 Drafting (1 Year)	14 Fashion Merchandising	15 General Business	16 Hotel-Motel Management	18 General Clerical (1 Year)	19 Office Services	20 Secretarial	21 Law Enforcement	22 Data Processing	23 Police Secretary	24 Medical Secretary (1 Year)	25 Stenographic (1 Year)	26 Legal Secretary	27 Mid-Management	28 Mechanical Engr. Technology	29 Electronics Engr. Technology	30 General Curriculum	31 Machine Practices (1 Year)	32 Electronics Service Technology (1 Year)	35 Homemaking-Business	36 Registered Nurse	40 Home Economics	41 Personal & Family Home Management	42 Child Care Assistant	45 Mining Technology	46 Technical Report Writing	Bilingual Secretary
H001	X		20		20									A1																				A1					
H003	X		11		11									A1																		A1		A1					
H006	X		23		23																											A1		A1		A1			
H057	X		16		16																															A1			
H058	X		0		0																															A1			
H062	X	X	9	18	27																															A1			
IT03	X		63		63			A1	A1	A1	A1																												
IT10	X		21		21			A1																			E1			E1									
IT12	X	X	24	--	24							A1	A1														E1			E1							A1		
IT15	X		40		40			A1		A1	E1	A1	A1																	A1									
IT17	X	X	23	22	45							A1	E1														A1	A1			A1						A1		

A_1 = 1st Semester Requirements
E_1 = Alternate Courses Avail.

COURSE		OFFERED		ENROLLMENT			IT98	IT75	IT71	IT69	IT65	IT54	IT55	IT41	IT40	IT26	IT21
		Fall	Spring	Fall	Spring	Total											
04	Agri-Business																
05	Production Agriculture																
06	Diesel Technology																
07	Auto Business																
09	Automotive Service Technology																
10	Automotive Mechanics (1 Year)										E1	A1	A1				
12	Drafting Technology															A1	A1
13	Drafting (1 Year)							A1	A1							A1	
14	Fashion Merchandising																
15	General Business																
16	Hotel-Motel Management																
18	General Clerical (1 Year)																
19	Office Services																
20	Secretarial																
21	Law Enforcement																
22	Data Processing																
23	Police Secretary																
24	Medical Secretary (1 Year)																
25	Stenographic (1 Year)																
26	Legal Secretary																
27	Mid-Management																
28	Mechanical Engr. Technology															A1	A1
29	Electronics Engr. Technology									A1				A1	A1		
30	General Curriculum																
31	Machine Practices (1 Year)																A1
32	Electronics Service Technology (1 Year)						A1	A1						A1	A1		
35	Homemaking-Business																
36	Registered Nurse																
40	Home Economics																
41	Personal & Family Home Management																
42	Child Care Assistant																
45	Mining Technology																
46	Technical Report Writing																
	Bilingual Secretary																
		X		25		25		X	X	X	X	X	X	X	X	X	X
			X							X	X					X	
				25	18	44		31	9	26	15	19	21	-	20	14	12
					22	35				18	22					27	
					19	19		31	9	44	35	19	21	-	20	41	12

A_1 = 1st Semester Requirements
E_1 = Alternate Courses Avail.

COURSE	LE10	LE20	LE85	MC11	MA07	MA17	PY20	NU01
OFFERED Fall	X	X	X	X	X	X	X	X
OFFERED Spring						X	X	
ENROLLMENT Fall	19	25	20	12	3	4	74	27
ENROLLMENT Spring						6	138	
ENROLLMENT Total	19	25	20	12	3	10	212	27
04 Agri-Business								
05 Production Agriculture								
06 Diesel Technology								
07 Auto Business								
09 Automotive Service Technology					E1			
10 Automotive Mechanics (1 Year)					E1			
12 Drafting Technology								
13 Drafting (1 Year)					E1			
14 Fashion Merchandising								
15 General Business								
16 Hotel-Motel Management								
18 General Clerical (1 Year)								
19 Office Services								
20 Secretarial								
21 Law Enforcement	A1	A1	A1					
22 Data Processing								
23 Police Secretary	A1	A1						
24 Medical Secretary (1 Year)								
25 Stenographic (1 Year)								
26 Legal Secretary								
27 Mid-Management								
28 Mechanical Engr. Technology						A1		
29 Electronics Engr. Technology								
30 General Curriculum								
31 Machine Practices (1 Year)								
32 Electronics Service Technology (1 Year)								
35 Homemaking-Business								
36 Registered Nurse							A1	A1
40 Home Economics								
41 Personal & Family Home Management								
42 Child Care Assistant								
45 Mining Technology								
46 Technical Report Writing				A1				
Bilingual Secretary								

APPENDIX B

Courses Required in Two or More Curricula

Course		Enrollment Fall	Spring	Total	Number of Curriculum Requiring 1st Semester
AG 01	Introduction to Agriculture	19	--	19	2
AG 10	Introduction to Agriculture	21	--	21	2
AR 06	Fundamentals of Design	22	--	22	3
BI 76	Human Anatomy	47	--	47	2
BU 15	Accounting	38	30	68	4*
BU 30	Introduction to Business	87	17	104	14*
BU 35	Principles of Accounting	42	17	59	1-4*
BU 38	Business Mathematics	43	44	87	15-2*
BU 42	Elementary Typing	29	1	30	2-1*
BU 44	Intermediate Typing	53	24	77	8-1*
BU 47	Shorthand	23	11	34	5*
BU 48	Shorthand Review	8	11	19	5*
BU 49	Intermediate Shorthand	8	10	18	1-5*
BU 54	Salesmanship	21	--	21	4*
BU 62	Introduction to Data Processing	12	32	44	7
CH 01	Elements of Chemistry	37	--	37	2*
CH 21	Elements of Chemistry	--	44	44	2*
EN 01	Writing Fundamentals	65	27	92	26
EN 02	Written Communications	271	98	369	26
HO 01	Costume Selection	20	--	20	2
HO 03	Clothing Construction	11	--	11	3
HO 06	Food Selection & Preparation	23	--	23	3
IT 03	Internal Combustion Engines	63	--	63	4

*Alternate course available

APPENDIX B (continued)

Courses Required in Two or More Curricula

Course		Enrollment Fall	Spring	Total	Number of Curriculum Requiring 1st Semester
IT 07 **MA 07	Introductory Mathmetics	--	--	--	3
IT 10	Principles of Drafting	21	--	21	1-2*
IT 12	Technical Drawing	24	--	24	3-2*
IT 15	General Metals	40	--	40	5-1*
IT 17	Technical Math	23	22	45	5-1*
IT 21	Materials of Industry	12	--	12	3
IT 26	Fund. of Electricity & Elect.	14	27	41	3
IT 30	Direct Current Circuits	20	--	20	2
IT 41	Vacuum Tubes & Semi-Conductors	--	--	2	2
IT 75	Electronics Drafting	31	--	31	2
LE 10	Intro. to Law Enforcement	19	--	19	2
LE 20	Criminal Law	25	--	25	2

*Alternate course available

**This course will be required of many technical students next year

APPENDIX C

Individual Course Matrix

IT 12 Technical Drafting
Dept. No. Title of Course

COURSE SEGMENTS	CURRICULUMS: Drafting Tech.	Drafting (1 year)	Mining Tech.	Mech. Eng. Tech.	Diesel Tech.	Machine Practice
I. Drawing Equipment, Mat. & Instruments	yes	yes	yes	yes	yes	yes
II. Basic Drawing Techniques	yes	yes	yes	yes	no	no
III. Lettering	yes	yes	yes	yes	no	no
IV. Geometric Construction	yes	yes	yes	yes	no	no
V. Multiview Projection	yes	yes	yes	yes	no	no
VI. Basic Dimensioning	yes	yes	yes	yes	yes	yes
VII. Drafting Department Practices	yes	yes	yes	yes	no	no
VIII. Section Views	yes	yes	yes	yes	yes	yes
IX. Auxiliary Views	yes	yes	yes	yes	no	no
X. Pictorial Drawings	yes	yes	yes	yes	yes	yes
XI. Fasteners	yes	yes	yes	yes	yes	yes

Above is the completed course Matrix for IT 12, Technical Drafting. The lay advisory committees for the above curricula met and discussed whether or not each course segment was appropriate for their particular curriculum. The instructor was available to explain in detail what was covered in each segment.

Each committee indicated with a "yes" those segments which were to be included in the course for students majoring in their curriculum. Segments which were not necessary were marked with a "no".