

AD-A126 455

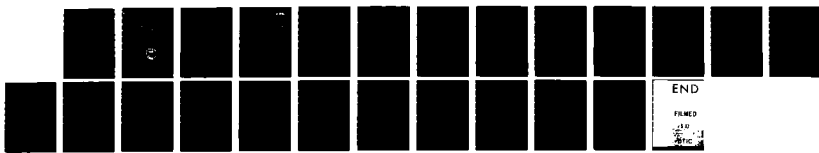
FEASIBILITY OF INDIVIDUALIZED INSTRUCTION FOR USMC  
PROFESSIONAL MILITARY. (U) HUMAN RESOURCES RESEARCH  
ORGANIZATION ALEXANDRIA VA M R FLANINGAM ET AL. MAR 83  
NPRDC-SR-83-19 N88123-88-C-0847

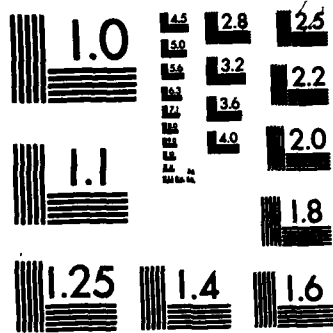
1/1

UNCLASSIFIED

F/G 5/9

NL





MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

ADA 126455

NPRDC SR 83-19

MARCH 1983

**FEASIBILITY OF INDIVIDUALIZED INSTRUCTION  
FOR USMC PROFESSIONAL MILITARY EDUCATION  
PROGRAMS: PHASE I. IMPLEMENTATION  
AT INSTRUCTIONAL MANAGEMENT SCHOOL**



DTIC  
ELECTE

APR 6 1983

A

DTIC FILE COPY

**NAVY PERSONNEL RESEARCH  
AND  
DEVELOPMENT CENTER  
San Diego, California 92152**

This document has been approved  
for public release and sale; its  
distribution is unlimited.

83 04 06 017



**FEASIBILITY OF INDIVIDUALIZED INSTRUCTION FOR USMC PROFESSIONAL  
MILITARY EDUCATION PROGRAMS: PHASE I IMPLEMENTATION AT  
INSTRUCTIONAL MANAGEMENT SCHOOL**

Michael R. Flaningam

Navy Personnel Research and Development Center

John N. Joyner

Human Resources Research Organization  
Carmel, California 93923



Reviewed by  
Joseph C. McLachlan

Released by  
James F. Kelly, Jr.  
Commanding Officer

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A	

Navy Personnel Research and Development Center  
San Diego, California 92152

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER NPRDC SR 83-19	2. GOVT ACCESSION NO. AD-A1-6435	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) FEASIBILITY OF INDIVIDUALIZED INSTRUCTION FOR USMC PROFESSIONAL MILITARY EDUCATION PROGRAM: PHASE I. IMPLEMENTATION AT INSTRUCTIONAL MANAGEMENT SCHOOL	5. TYPE OF REPORT & PERIOD COVERED Interim 2-81--6-81	
	6. PERFORMING ORG. REPORT NUMBER 14-82-10	
7. AUTHOR(s) M. R. Flaningam, NAVPERSRANDCEN J. N. Joyner, HumRRO	8. CONTRACT OR GRANT NUMBER(s) N00123-080-C-0847 CF63-521-080-521-102-03.06	
9. PERFORMING ORGANIZATION NAME AND ADDRESS Navy Personnel Research and Development Center San Diego, California 92152	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62763N, F63521	
11. CONTROLLING OFFICE NAME AND ADDRESS Education Center Marine Corps Development and Education Command Quantico, VA 22134	12. REPORT DATE March 1983	
	13. NUMBER OF PAGES 23	
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report) UNCLASSIFIED	
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE	
16. DISTRIBUTION STATEMENT (of this Report)  Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)  Individualized instruction Professional military education Self-paced instruction		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  This report describes the implementation of individualized instruction at a USMC Instructional Management School (IMS), which trains instructors of professional military education courses. The IMS instructor course was converted from fixed-entry, lock-step and lecture-base to variable-entry, self-paced, application-base. Course materials were modularized so that training could be tailored to individual needs.		

DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 68 IS OBSOLETE  
S/N 0102-LF-014-6601

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

## FOREWORD

This research and development was conducted in support of exploratory development task area CF63-521-080-102 (USMC Training and Education), work unit 03.06 (USMC Professional Military Education), and was sponsored by the Education Center, Marine Corps Development and Education Command, Quantico, Virginia. The project was initiated as the result of a FY80 Proposed Exploratory Development Efforts document, which specified a need for (1) new alternatives to traditional group-paced instructional programs for resident Marine Corps professional military education (PME) and (2) new strategies in nonresident courses that would improve student motivation, provide interaction with peers and instructors, and provide feedback on acquisition and comprehension.

This report, the first in a series, describes the implementation of an individualized instruction system at the Instructional Management School (IMS), Quantico. Subsequent reports will describe the application of the system to resident and nonresident PME courses.

Appreciation is expressed to the IMS instructors and staff, especially LTCOL G. Kelly, who was the director of IMS during the effort and whose dedication and enthusiasm contributed immeasurably to the success of the effort.

JAMES F. KELLY, JR.  
Commanding Officer

JAMES W. TWEEDDALE  
Technical Director

## SUMMARY

### Problem

Although training costs for resident professional military education (PME) courses continue to rise, there is no assurance that training is more effective. Conventional lock-step, group-paced instruction does not permit either the efficient use of facilities or the flexibility to meet individual enrollee's needs.

### Objective

The overall goal of this effort is to increase the efficiency and effectiveness of selected resident courses by instituting an individualized instruction and evaluation system. The purpose of the effort described herein was to implement an individualized instruction system at the Instructional Management School (IMS), Quantico, Virginia, which trains instructors of PME courses.

### Approach

An individualized instruction and evaluation system was implemented at IMS that permitted enrollees to enter when they were assigned. The course was designed in modular fashion to permit selection of training according to enrollees' needs. The course used the group mode of instruction to critique students' instructional presentations. Instructors played a key role as facilitators for the course, being available to clarify course content as needed.

### Results and Conclusions

Implementation of individualized instruction at IMS was a success. Students are trained more efficiently, with IMS training now requiring an average of 3 weeks, compared to the 4 weeks previously required. The course is also more effective in that students can practice relevant skills more frequently. The necessary degree of group interaction was retained and its effectiveness maintained.

### Recommendations

1. The prototype course should be made operational and implemented at other IMS sites.
2. Consideration should be given to using course techniques and materials in formal schools where individualization can be applied while maintaining necessary group interaction.
3. Alternative modes of presentation should be investigated and considered for application at IMS to increase course flexibility and individualization.

## CONTENTS

	Page
INTRODUCTION . . . . .	1
Problem . . . . .	1
Objectives . . . . .	1
Background . . . . .	2
APPROACH . . . . .	3
Overview . . . . .	3
Subjects . . . . .	5
Materials . . . . .	5
Instructor Role . . . . .	6
Course Procedure . . . . .	7
Course Control . . . . .	9
Course Analysis . . . . .	9
RESULTS AND DISCUSSION . . . . .	13
RECOMMENDATIONS . . . . .	15
REFERENCES . . . . .	17
DISTRIBUTION LIST . . . . .	19

## LIST OF TABLES

1. List of Lessons at IMS . . . . .	4
2. Module Usage and Completion Times . . . . .	14

## LIST OF FIGURES

1. Lesson structure . . . . .	7
2. Lesson control card . . . . .	10
3. Course control chart . . . . .	13



## INTRODUCTION

### Problem

Professional military education (PME) for the Marine Corps is accomplished primarily through the resident schools at Quantico, Virginia, and nonresident courses offered through the Marine Corps Institute (MCI). The resident and nonresident programs are managed by the Education Center, Marine Corps Development and Education Command (MCDEC). These programs range from basic training through career and intermediate level training for Marine Corps officers and staff noncommissioned officers (SNCOs).

The group-paced lecture mode of instruction, which is predominantly used for the resident programs, precludes the maximum use of resources. Students must wait for classes to convene rather than begin coursework upon assignment to a school. Some of the longer courses can be offered just once a year in the group-paced mode, thus limiting access by prospective students. Some students in a course may find there is too little time to accomplish course objectives, while others find there is too much time, especially if the course is relatively simple or repeats material the student has already studied.

In the group-paced mode, all of the students need to access available resources (e.g., videotape equipment) at the same time. Thus, these resources are heavily used at certain times and relatively unused at other times. Similarly, students in a group-paced lecture course cannot readily pass over information they already know to spend more time in areas with which they are unfamiliar. Instead, they must proceed along with the class.

Evaluation of students in the traditional group-paced mode typically does not permit rapid, prescriptive feedback to each student except in those schools that are organized around student conference groups (e.g., Amphibious Warfare School, Command and Staff College). Although students in these schools receive detailed feedback from conference group leaders, they still do not, as a rule, receive truly prescriptive feedback. Since all students in conventional courses are usually tested at the same time, the instructor does not have time to cope with each student's particular needs. Further, the instructor cannot readily track student accomplishments on a day-to-day basis.

The group-paced course at the Instructional Management School (IMS) at Quantico, Virginia, which prepares the instructors and managers of the PME courses, was similarly structured. It lacked the flexibility of instruction and timeliness of evaluation that could be obtained through an individualized program. As with the resident courses, IMS students had to wait for set entry dates and take the entire block of instruction as a class. Because the group-paced mode does not provide an opportunity for individual practice, individual student deficiencies cannot be identified prior to scheduled evaluations.

### Objectives

An overall goal of this effort is to respond to the Marine Corps requirement to increase the instructional effectiveness of its PME programs while achieving greater efficiency in their generation and delivery. This effort will be based on the hypothesis that the efficiency of selected resident instruction can be increased by instituting individualized instruction. A related objective is to design a formal evaluation system to be used in individualized courses that will provide systematic data for the evaluation of instruction and for instructional management.

The purpose of the effort described herein is to assess the application of a modified individualized instruction and evaluation system to IMS, Quantico. The system is modified

in the sense that it does not provide individually tailored materials, but it does permit individual selection of some of the modules. Moreover, each individual can proceed at his own pace through the system. It is believed that the results of this effort will provide a basis for implementing similar individualized instruction in other PME courses.

### Background

There have been numerous efforts in recent years to apply individualized instruction to formal military courses. The publication of the Navy's Interservice Procedures for Instructional Systems Development (NAVEDTRA 106A) and other documents such as the Marine Corps' Instructional Systems Development (MCO-P1510-23B) have contributed to the implementation of this process. However, development of an individualized approach, as described in these documents, can be quite complex and time consuming. Many course instructors have found it difficult to implement individualized instruction successfully while also meeting their other instructional commitments. As a result, organizations have been created both within and outside the government to facilitate the individualization process. Most of the applications of individualized instruction in the military have been to technical training courses; that is, those requiring considerable hands-on training. Very little has been done for training that is as heavily knowledge-based and cognitive in nature as is PME for officers and SNCOs.

Nonetheless, in instances where individualized instruction has been appropriately applied, it has been found to contribute significantly to effectiveness and efficiency of training (Orlansky and String, 1979). One factor that seems to account for its success is that individualization accommodates for the individual differences existing among people in learning ability, skill and knowledge, and motivation. At the extreme, some students may be virtually unable to learn from a particular approach, while others learn quite well using the same method. Individualization, which, in this case, is not synonymous with any one particular method or medium of instruction, permits these differences to be accommodated.

It is useful to note the distinction between the terms "individualized instruction" and "individualized learning." Instruction may be more or less individualized while learning, inherently, is always individual. This is true even in team training situations, where the team proficiency improves but the knowledge acquired by each crew member may not be specifiable.

Since learning itself is an individualized process, instruction that attempts to accommodate that fact can be expected to be more effective, all other things being equal. This does not mean that all applications of individualized instruction are inevitably more efficient. As with any other procedure, the efficiency of instruction is determined by comparing costs to results. Whether the effort of individualizing is justified by increased instructional effectiveness must be determined within the concept and goals of each specific implementation. Although individualization may involve high initial costs, even small improvements in training effectiveness may result in greater cumulative efficiency over the long term.

Nonindividualized instruction (e.g., "lock-step" or "group-paced" instruction) is the primary mode of instruction currently used for resident PME instruction. This mode of instruction requires every student to follow essentially the same path through the course content and to experience the same instructional events. The nonindividualized system does not differentiate among individuals on the basis of their responses while in the course (e.g., test performance) or on their background characteristics (e.g., previous knowledge or aptitude).

The present effort to individualize the IMS deals with content components and program components that belong in any instruction system, but without the restrictions imposed by the lock-step approach. Accordingly, the IMS effort includes methods of managing instruction so that individual differences will be accommodated. It is believed that instructors of PME courses who receive individualized training will be better prepared for the task of implementing individualized instructional systems in their own courses.

## APPROACH

### Overview

Existing IMS materials and instruction were analyzed and revised, and additional materials were developed. All materials were arranged into a modular, self-paced format. Each lesson module included (1) a lesson overview, which described lesson objectives, the procedures to be learned, and testing methods, (2) a workbook, which explained the subject and contained study questions and practical exercises with exemplar solutions, and (3) a lesson test, which usually required the student to produce an instructional development product (e.g., learning objectives). The modules are listed in Table 1.

The IMS course was designed to provide a core curriculum that varied depending on whether students were to become instructors or instructional managers. In addition, there is a cluster of elective modules from which students can select, depending on their prior knowledge or individual job requirements. The instruction was designed primarily to be self-paced, with the instructor assisting when problems were encountered. The group process was maintained in those portions of the course (e.g., the presentation modules) where group interaction is essential.

The individualized instruction system that was designed for IMS can best be characterized as a variable-objective, variable-time, fixed-proficiency, fixed-treatment system whose principal method of instruction is practical exercise with tutorial assistance (Matlick, Swezy, and Epstein, 1980).

The instruction objectives can be varied according to a student's needs and interests, in cooperation with the student's PME school director. For example, a new instructor at one of the PME schools might enroll at IMS to learn how to write instructional objectives, develop a lesson plan, deliver a lecture, and develop and administer tests. Another instructor might enroll to learn how to carry out job and task analysis, write job performance requirements, and write a target population description. The list of lessons available at IMS can be sent to school directors and to each prospective student. Thus, the student and school director can decide the student's course of study before enrollment at IMS.

The time can vary as a function of learning rate. This is an open-entry, open-exit system. Each lesson is self-paced, and a student can begin one lesson as soon as the previous one is mastered.

The minimum level of proficiency required to demonstrate mastery of a lesson objective is the same for all students. However, there is nothing to prevent a student from exploring a subject to greater depth or practicing a skill to a higher level, if the student's school director approves continued attendance at IMS.

Table 1  
List of Lessons at IMS

---

0101	INTRODUCTION TO JOB DESCRIPTION
0102	DESCRIBING JOB TASKS
0103	GOAL ANALYSIS
0104	JOB PERFORMANCE REQUIREMENTS
0201	DEVELOPING OBJECTIVES
0202	DEVELOPING OBJECTIVE-REFERENCED TESTS
0203	TARGET POPULATION DESCRIPTION
0301	SEQUENCING TERMINAL LEARNING OBJECTIVES
0302	IDENTIFYING INSTRUCTIONAL ACTIVITIES
0303	DEVELOPING INSTRUCTION
0304	SELECTING INSTRUCTIONAL METHODS AND MEDIA
0305	THE LESSON FILE
0306	THE GUIDED DISCUSSION
0307	THE SELF-PACED LESSON
0308	THE LECTURE
0309	THE TAPE/SLIDE LESSON
0310	VALIDATION
0401	15-MINUTE PRESENTATION
0402	EXTENDED PRESENTATION
0403	EXTENDED PRESENTATION
0501	INTERNAL EVALUATION
0502	EXTERNAL EVALUATION
0503	REVISION
0601	ORIENTATION TO IMS
0602	INSTRUCTIONAL SYSTEMS DEVELOPMENT
0603	MASTERY TEACHING
0604	MOTIVATION
0605	COUNSELING
0606	COURSE CONTENT REVIEW BOARD

---

Fixed treatment in this case does not mean that every student is treated the same way throughout a lesson, as in a lock-step system. Rather, it means that the initial treatment is the same and that subsequent adaptations to the learner's behavior are

variations in that treatment. The system does not initially treat students with one set of background experiences differently from students with other experiences. Nor does it incorporate a formal branching program with presentations, explanations, or exercises systematically adapted to students' responses during instruction.

The principal method of instruction is individual practice with tutorial assistance. The system depends relatively less on the effectiveness of the initial written or spoken presentations and more on the effectiveness of assistance given to the student during practice exercises. The existing instruction system at IMS had already been individualized to the extent that individual practice with tutorial assistance occurred after the initial group-paced lecture and discussion. This tutorial aspect was retained to become one of the principal characteristics of the new system. Thus, the new system does not represent so much a change in instructional technique as it does changes in scheduling and control of students. These changes, as well as changes in the method of initial presentation of subject matter, allow the method of tutorial assistance to be used more extensively. However, this places a greater burden on the instructor, who must now be prepared for a topics at all times rather than only a single topic as usually required under lock-step instruction.

### Subjects

The subjects for this investigation were 63 enrollees at the IMS instructor training course during a 6-month period.

### Materials

The primary medium of instruction for this system is printed text. The workbook for each lesson introduced the subject matter and contained practice exercises with model answers. Many of the workbooks also contained job aids, usually checklists to assist the student in accomplishing a task. For this course and many similar contexts, print offers the following instructional advantages over live presentations and audiovisual media:

1. It is easier for the student to study and restudy print. Although most tape/slide lessons can be reversed, this is practical only for reviewing one or two frames of instruction. Because of the difficulty of synchronizing the audio and visual components, it is not convenient to find one's place in the middle of a tape/slide lesson nor to study it for just a few minutes at a time. Likewise, it is easier for an instructor to direct a student's attention to a particular segment in a workbook than in a tape/slide lesson.
2. Workbooks can be studied at any time both in and away from the classroom. Moreover, the student can keep them after graduation for use as references on the job.
3. Print can be revised more easily. Additions and corrections require only typing, rather than audio recording, art work, and photography. Between printings, corrections can be made by hand.
4. Workbooks can be "personalized" by the student or instructor, important points underlined, examples sketched in, and so forth.

A secondary planned medium was tape/slide. The tape/slide lessons were designed to be equivalent in content to the printed lessons. This alternative was included in the system, in part, to demonstrate to the future instructors the feasibility of employing this medium in their own schools. Due to cost and time limitations, however, none of the tape/slide lessons were available for initial implementation. Several scripts were

developed, which, when produced, should contribute positively to the lessons. In the interim, the written materials, which contain all the essential course information, will serve adequately as the primary medium.

### Instructor Role

The instructor, having the greater repertoire of responses and being more adaptable, is considered relatively more important than the instructional materials. The workbooks and other written materials serve to support the instructor's role, not the reverse. By stating the goal of the lesson and presenting subject matter at the outset, the materials point the student in the intended direction and save the instructor considerable repetition of background and introductory information. By presenting practice exercises, the materials also provide a framework for the tutorial activities.

Within this framework, instructors act as tutors in the classroom with a "workshop" atmosphere. While students are engaged in practice exercises, the instructors provide "over the shoulder assistance," both at student request and according to their own judgment. There is no specific point scheduled in the instruction when the instructor's help is specified, but the student has no obligation to learn from the materials alone. The instructor is always available to provide a quicker, easier explanation. It is the instructor's role, then, to provide the instructional context so that the student can work and learn from the materials. When needed, the instructor still must instruct; that is, he must explain, demonstrate, give examples, and interpret the materials as necessary.

The individualized system for IMS is based on the premise that the easiest way to learn something is often simply to have someone tell you. It is also supported by the fact that the student-instructor ratio at IMS is low enough (6:1) to support an essentially tutorial approach.

In some individualized instructional systems, the instructor's role is primarily that of a manager of instruction. The instructor at IMS, however, is expected to spend time primarily assisting students, rather than deciding what the student should do next. To the greatest extent possible, the decision of what to do next is incorporated in the program. When a student fails a lesson test, the instructor is called on to prescribe additional study, with no great amount of time required for the decision process.

A potential conflict can be foreseen between the instructor's roles as tutor and as evaluator; that is, a student who fails a test may perceive the evaluator as responsible. Little can be done to eliminate this potential difficulty, but its occurrence can be minimized by having tests scored as objectively as possible. For most tests, an answer guide is provided to the instructor that reduces the question of response adequacy to a yes/no decision whenever possible. For example, rather than allowing an instructor to determine the acceptability of a student's written objective, the answer guide identifies and lists components of acceptability (e.g., (a) Is it observable?, (b) Could it be tested?, (c) Is the behavior unambiguous?). Each of these component questions can be answered in a yes-no fashion. It is believed that the use of such guidelines increases the reliability of scoring across instructors and decreases the potential for conflict between instructor and student by reducing the appearance of subjectivity in grading.

Finally, the instructor is responsible for detecting and correcting deficiencies in the instructional materials. Given the close working relationship of student and instructor, it should not be difficult to detect deficiencies in the materials. To ensure that corrections and improvements are made, instructors must be rigorous in recording errors, omissions, or other deficiencies of the materials. One set of the materials is set aside exclusively

for the purpose of recording errors and revisions since there are to be several instructors involved.

Course Procedure

A typical lesson structure is shown in Figure 1. The overview includes a description of the lesson objective, the lesson content, and the nature of the tests. It serves to introduce the lesson and to provide the student with enough information to decide whether to attempt the lesson pretest immediately.

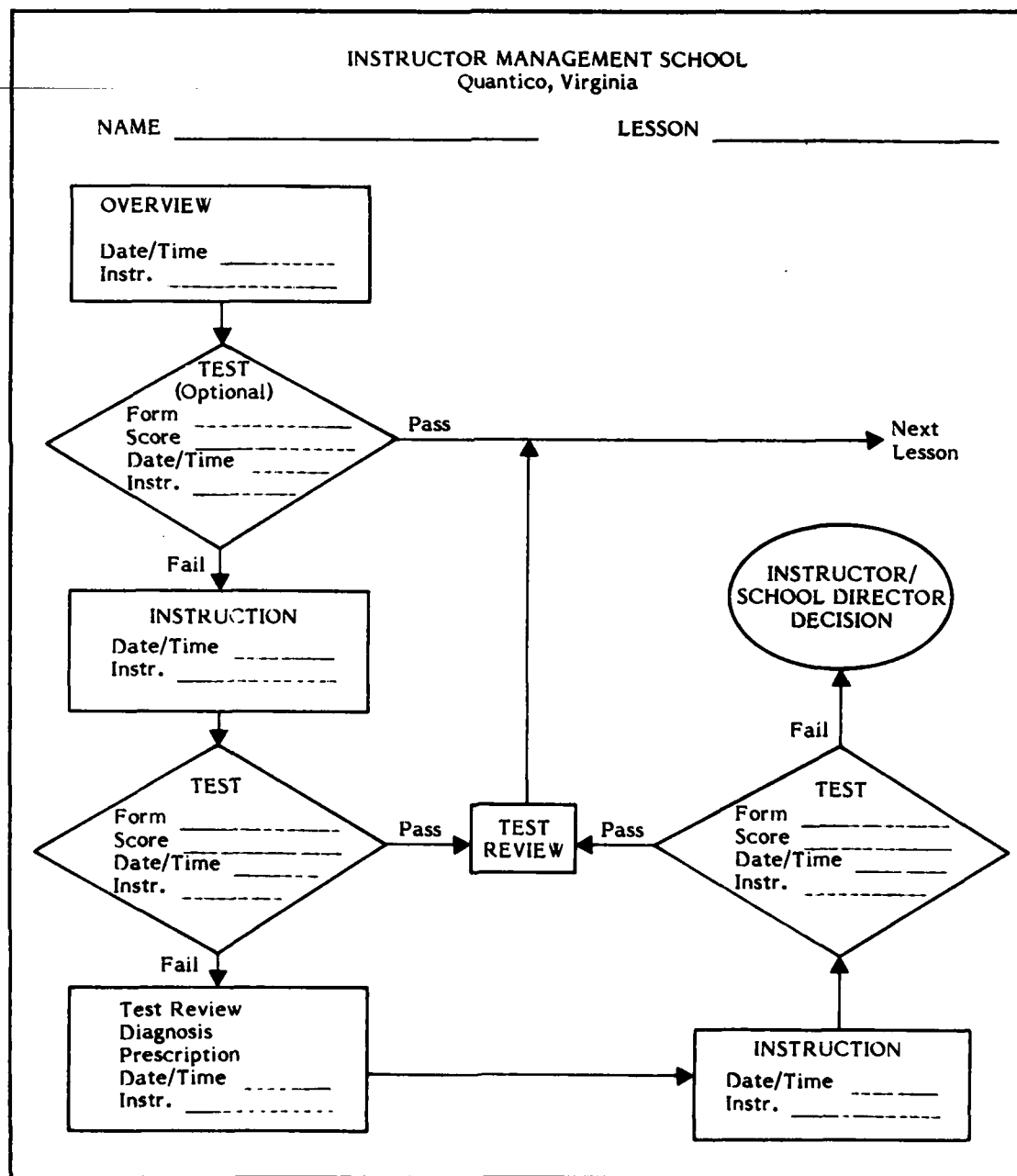


Figure 1. Lesson structure.

Students are permitted to "challenge" any lesson by taking a pretest before any instruction. However, since it is not expected that many students will wish to challenge the lesson, the pretest is not mandatory. At the student's option, the instruction phase can begin directly after reading or watching the lesson overview.

Efforts were made to ensure that practice exercises are consistent in form, content, and difficulty with the test criteria. In essence, the practice exercises and test items are virtually identical. Having the student write instructional objectives for practice is not substantially different from having them write objectives for evaluation purposes.

Presentations of content, whether from the instructor or the instructional materials, are brief. Their main purpose is to give the student enough information to begin the practice exercises. The system is based on the premise that concepts are better learned by applying them than by reading or hearing about them, given that tutorial assistance is available.

In the lock-step IMS course, student instructors gave several scheduled presentations before a group of their peers. This aspect is maintained in the individualized system. Presentations are scheduled in advance when some or all of the students enrolled at IMS can be assembled to serve as an audience without significantly interrupting their own work. Students also have the opportunity to rehearse before a videotape camera and review this recorded presentation a number of times before the live presentation to the group.

The embedded tests and practice exercises provide a source of feedback to the students on their progress through the instructional materials. The instructors also provide feedback in the form of analysis of inappropriate responses, alternate explanations, diagnoses, and whatever else, in the instructor's judgment, will help the student learn.

When the student completes the instructional phase of the lesson, he or she takes a test, which is graded by the instructor, using an answer key or guide as applicable. Test feedback consists of reviewing test performance with the student and drawing attention to strengths or weaknesses. This is considered desirable both for students who pass the test and do not study the lesson further, and for students who fail. The procedure is similar to that of giving students feedback during the instructional phase and consists largely of (1) providing models of appropriate responses and (2) explaining to the students why their error responses are inappropriate. The latter could be called first-order diagnosis and should often be the only diagnosis required.

In instances where providing a model of the correct responses would eventually compromise the test, this review must be somewhat less thorough than otherwise. Even in these cases, however, it is possible to point out areas of strength and weakness and give examples of alternate illustrative responses. In most cases, it should be possible to indicate exactly what is wrong (e.g., the student-written objective is not stated in terms of behavior that is observable).

Students who fail the test may need what is called second-order diagnosis. This is an explanation of the cause behind the error, such as an examination of an incorrect concept that gave rise to the error. Students who fail the test are assigned additional instructions: practice exercises that correspond to the failed portions of the test. Also, students may be directed to restudy selected presentations of subject matter.



Figure 1 shows a return to the instruction phase after a failure on the second test. This indicates that additional instruction (i.e., whatever was prescribed by the instructor) is based on the same set of instructional materials used initially. This is not a branching system with alternate media for students who have difficulty understanding it the first time. Additional instruction differs from the initial instruction, however, in at least two ways:

1. The instructor prescribes only selected portions of the initial instruction.
2. The instructor selects or devises alternative exercises to those practiced initially. For example, if an initial exercise consisted of writing instructional objectives for job tasks, the instructor designates new job tasks for this repeat phase.

The lesson cycle does not continue indefinitely. After additional instruction, the student is retested. If the student fails the retest, the instructor decides whether to halt the process and send the student on to a new lesson. This is a decision based, in part, on the student's progress and willingness to continue. If students frequently fail to master a particular lesson, the practice exercises and the test will be examined to determine if students are failing because of deficiencies in the instructional materials.

#### Course Control

To monitor each student's progress through the course, the names of the lesson a student will study are entered on a series of lesson control cards (Figure 2). The cards for all students are assembled in a common ring binder. The boxes on the lesson control card illustrate what action the instructor should take at each point throughout a lesson. The instructor uses the card as a guide, and it also becomes a record of student progress as the instructor enters test scores and dates.

The lesson control cards show each individual student's progress within a lesson and within the set of lessons for which the student enrolls. To show the progress of all students at once, the information on the lesson control cards is posted on a course control chart (Figure 3). This chart displays the number of students enrolled, how long each student has been at IMS, approximate time spent on each lesson, the number of lessons yet to be completed, and the estimated date (if any) for the student to return to his or her own school.

#### Course Analysis

There are such broad differences between the way the conventional lock-step course and the prototype individualized course are structured and conducted that quantifiable comparisons are not meaningful for many variables. For example, direct comparisons of time spent in training would be confounded by the fact that, in the lock-step course, all students were required to go through all the course while, in the individualized course, they could select only those modules they need. Performance measurements are similarly confounded by this selectivity, because students in both courses did not necessarily cover the same or comparable material. The results provided by this report, therefore, focus primarily on how the prototype individualized course was implemented and what practical benefits accrued from this instructional application.

Entry: \_\_\_\_\_ MGR

NAME: \_\_\_\_\_

PRETEST	LESSON	START LESSON	FINISH LESSON	POST-TEST	START ADDT'L	FINISH ADDT'L	POST-TEST	INSTRUCT DECISION
Orientation	0601	date: time: inst:	time:	date: total: time:	date: time:	date: time:	date: total: M <input type="checkbox"/> NM <input type="checkbox"/>	I: _____
ISD	0602						M <input type="checkbox"/> NM <input type="checkbox"/>	_____
Intro to Job Desc.	0101						M <input type="checkbox"/> NM <input type="checkbox"/>	_____
Mastery	0603						M <input type="checkbox"/> NM <input type="checkbox"/>	_____
I Dev Obj	0201						M <input type="checkbox"/> NM <input type="checkbox"/>	_____
II							M <input type="checkbox"/> NM <input type="checkbox"/>	_____
Develop Obj-ref Tests	0202						M <input type="checkbox"/> NM <input type="checkbox"/>	_____
T. Pop	0203						M <input type="checkbox"/> NM <input type="checkbox"/>	_____

Figure 2. Lesson control card.

Entry: \_\_\_\_\_

MGR

NAME: \_\_\_\_\_

PRETEST	LES- SON	START LESSON	FINISH LESSON	POST- TEST	START ADDT'L	FINISH ADDT'L	POST- TEST	INSTRUCT DECISION
Sequencing	0301						M <input type="checkbox"/> NM <input type="checkbox"/>	___
Develop Inst.	0303						M <input type="checkbox"/> NM <input type="checkbox"/>	___
Motiva- tion	0604						M <input type="checkbox"/> NM <input type="checkbox"/>	___
Media	0304						M <input type="checkbox"/> NM <input type="checkbox"/>	I: ___
Lecture	0308						M <input type="checkbox"/> NM <input type="checkbox"/>	___
Concept Card	0302						M <input type="checkbox"/> NM <input type="checkbox"/>	___
Lesson File	0305						M <input type="checkbox"/> NM <input type="checkbox"/>	___
Valida- tion	0310						M <input type="checkbox"/> NM <input type="checkbox"/>	___

Figure 2. Continued.

Entry: \_\_\_\_\_ MGR

NAME: \_\_\_\_\_

PRETEST	LESSON	START LESSON	FINISH LESSON	POST-TEST	START ADDT'L	FINISH ADDT'L	POST-TEST	INSTRUCT DECISION
Internal Evaluation	0501						M <input type="checkbox"/> NM <input type="checkbox"/>	_____
Revision	0503						M <input type="checkbox"/> NM <input type="checkbox"/>	_____
External Evaluation	0504						M <input type="checkbox"/> NM <input type="checkbox"/>	_____

Figure 2. Continued.

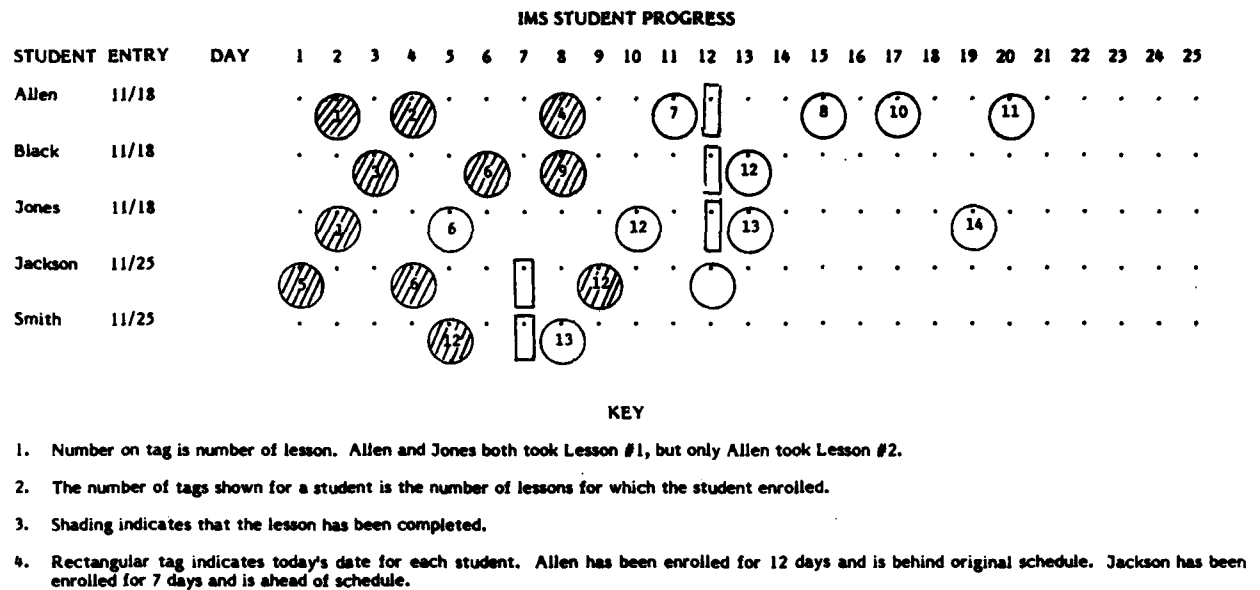


Figure 3. Course control chart.

## RESULTS AND DISCUSSION

The individualized course was monitored for 6 months, during which time recordable data were acquired for 63 students. One evident impact resulting from the individualized course was the increased opportunity for a student to enter the course. Within the 6-month period monitored for this effort, there was always available space with very few delays for entering students. An average of 5 students were present each day, although the number for individual days ranged from 0 to 12. The schools that send candidates to IMS were informed that, instead of awaiting regularly scheduled course start dates, they could send personnel almost any day. Essentially, all that was required was a call to IMS to inquire about available space.

This redistribution of students has allowed for better use of materials and facilities. For example, with individualization, students took different lengths of time to reach the point in the course when they needed to use the videotaping capabilities. As a result, they were able to use the system to improve their presentations almost without limitation.

The attendees, in coordination with their school directors, customized their training programs. Table 2 indicates how frequently each module was used for the monitored period. Table 2 also contains the range, standard deviation, and average recorded times needed to complete modules used 10 or more times and the mean times needed to complete those modules used less than 10 times. These recorded times are subject to

**Table 2**  
**Module Usage and Completion Times**

Modules (Identifier)	Number Times Used	Time to Complete (Minutes)		
		$\bar{X}$	SD	Range
<b>Modules Used More Than 10 Times</b>				
Orientation to IMS (601)	27	29	13	10-60
Instructional systems development (602)	32	102	28	60-190
Introduction to job description (101)	36	76	50	20-310
Mastery teaching (603)	37	120	51	50-255
Developing objectives (201)	37	226	109	45-585
Developing objective-referenced tests (202)	32	123	71	40-375
Developing instruction (303)	32	201	202	15-1125
Motivation (604)	36	96	66	20-315
Selecting methods and media (304)	28	125	69	22-320
The lecture (308)	33	150	106	58-490
Identifying instructional activities (302)	11	135	141	30-345
Validation (310)	20	87	59	25-272
Internal evaluation (501)	24	80	46	10-195
Revision (503)	16	37	30	05-105
Counseling (605)	20	121	54	55-248
<b>Modules Used Less Than 10 Times</b>				
The lesson file (305)	5	280		
Describing job tasks (102)	3	105		
Goal analysis (103)	2	73		
Job performance requirements (104)	1	70		
Target population description (203)	3	30		
Sequence learning objectives (301)	5	44		
The guided discussion (306)	5	64		
The self-paced lesson (307)	4	69		
The tape-slide lesson (309)	3	105		
External evaluation (502)	3	352		

error due to difficulties in determining from the records whether or not the recorded times for all individuals included the time required for testing. Some of the recorded lesson times appear spuriously long and may include time away from the lesson due to leave or other personal matters.

The average length of time spent at IMS for the 63 students was 14 days, with a range of from 2 to 50 days and a standard deviation of 8.1 days. Since these data were calculated by counting all days from the first to the last, the mean times include any absences. For example, the 51st and 60th students were at IMS for 50 and 42 working days respectively. As with the lesson times, these data probably include time away from class. If the 51st and 60th students were dropped from the calculations, the average time

would drop a full day. Even at 14 days, however, this is approximately 1 week less of actual training time than was required to complete the conventional course. Again, it should be noted that this is not intended as a comparison of equivalent courses since the students attending the individualized course could select only those modules they wanted to study, unlike those in the conventional course. Informal feedback from the schools where the graduates have returned has indicated that the individualized course attendees are estimated to be at least as well qualified as conventional course graduates.

Individualization was accompanied by fewer student interactions with instructors than had been anticipated. This may have been related to a desire of students not to fail or appear inadequate, although most students did discuss test results with the instructors. Between tests, however, they made relatively few requests for assistance of the instructors. One instructor could usually handle all interactions on a normal class day. The amount of interaction among students seemed to remain approximately the same as it was under conventional instruction. This was somewhat expected since, even though individualization allowed increased opportunities for peer interaction, students were usually working on different modules or tasks. As with the conventional course, interactions among students were particularly effective during post-presentation sessions. The efficacy of the group process was thus maintained where it could be most beneficial in the individualized system.

#### **RECOMMENDATION**

1. The prototype individualized course should be considered for formal incorporation into the training program at this IMS site. Also, the course should be implemented at the other IMS sites if review and cost benefit analysis prove favorable.
2. Consideration should be given to applying the course to other training sites that prepare formal school instructors.
3. Alternate presentation modes should be investigated and developed to provide increased instructional flexibility and individualization to the course.

## REFERENCES

- Interservice procedures for instructional systems development (NAVEDTRA 106A). Pensacola, FL: Chief of Naval Education and Training, 1975.
- Instructional Systems Development (MCO-P1510-23B). Washington, DC: Headquarters United States Marine Corps, 1978.
- Matlick, R., Swezey, R., & Epstein, K. Alternative models for individualized armor training: Part I. Interim report: Review and analysis of literature (RN 80-1). Springfield, VA: Litton Millonics Systems Development Division, January 1980. (AD-A08V922).
- Orlansky, J., & String, J. Cost effectiveness of computer-based instruction in military training (IDA Paper P-1375). Arlington, VA: Institute for Defense Analyses, 1979.



## **DISTRIBUTION LIST**

**Chief of Naval Operations (OP-01), (OP-11)**  
**Chief of Naval Material (NMAT 05)**  
**Deputy Chief of Naval Material (Technology)**  
**Chief of Naval Research (Code 200)**  
**Chief of Naval Education and Training (02)**  
**Commandant of the Marine Corps (MPI-20)**  
**Commander Training Command, U.S. Atlantic Fleet**  
**Commander Training Command, U.S. Pacific Fleet**  
**Commanding Officer, Naval Education and Training Program Development Center (Technical Library) (2)**  
**Commanding Officer, Naval Education and Training Support Center, Pacific**  
**Commanding Officer, Service School Command, San Diego (Code 3200)**  
**Director, Defense Activity for Non-Traditional Education Support**  
**Director, Management Information and Instructional Activity Branch Office, Memphis**  
**Director, Naval Civilian Personnel Command**  
**Director, Naval Education and Training Program Development Center Detachment, Great Lakes**  
**Director, Naval Education and Training Program Development Center Detachment, Memphis**  
**Commandant, Marine Corps, U.S. Headquarters, (MC-TDE)**  
**Commanding General, Marine Corps Development and Education Command**  
**President, National Defense University (3)**  
**Defense Technical Information Center (DDA) (12)**

5-8

DT