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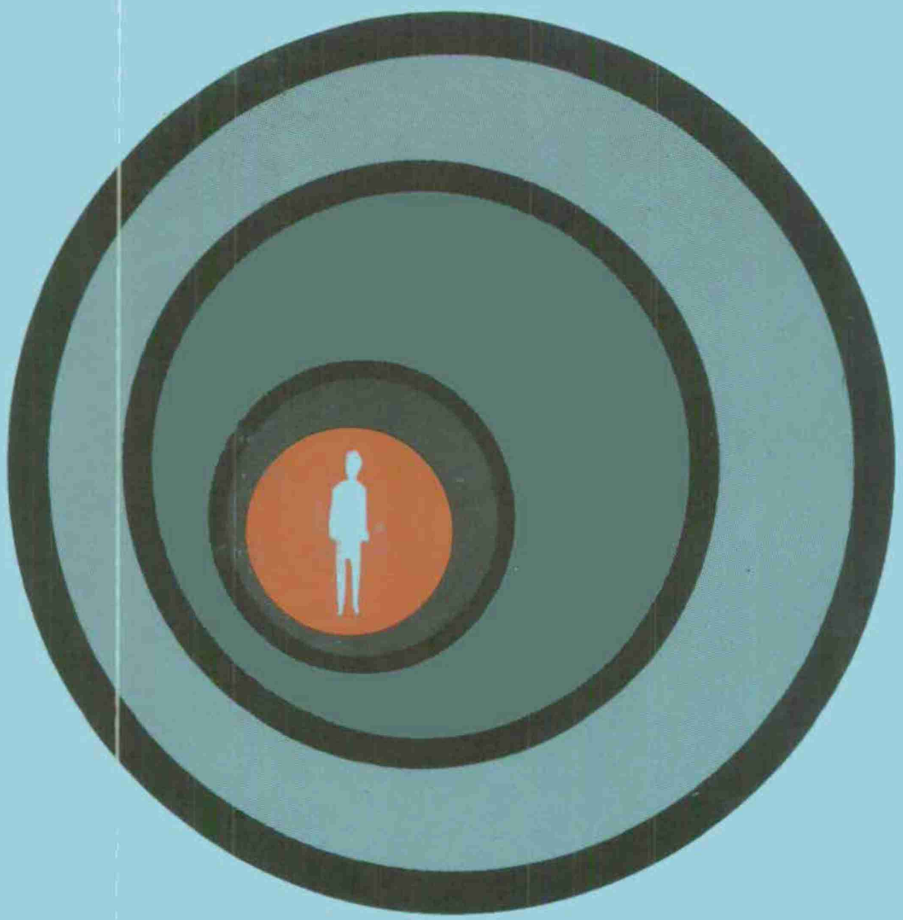
TRAINING ANALYSIS AND EVALUATION GROUP

TAEG REPORT NO. 25

MILITARY INSTRUCTOR TRAINING IN TRANSITION

PROCEEDINGS OF AN INTER-SERVICE CONFERENCE



FOCUS ON THE TRAINED MAN

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This volume presents a series of papers read at the conference on "Military Instructor Training in Transition," held on 15-17 January 1975, at the Naval Training Center, Orlando, Florida. The conference was hosted by the Training Analysis and Evaluation Group (TAEG) of the Chief of Naval Education and Training. The purpose was to bring together people involved in instructor training from the military services, industry and academia to exchange ideas and to discuss mutual issues, problems and trends in producing effective instructors.

The objectives of the conference were to (1) present a sampling of instructor training in today's military environment, (2) to articulate plans and programs of the immediate future and qualitative changes projected for the next generation instructor training system, and (3) to present innovative concepts relevant to the long-range planning for instructor training.

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MILITARY INSTRUCTOR TRAINING IN TRANSITION

Edited by

Alfred F. Smode
Karen D. Lam

Proceedings of an inter-service conference that convened January 15-17, 1975 at the Naval Training Center, Orlando, Florida.

May 1975

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ACKNOWLEDGEMENTS

This conference was convened by the Training Analysis and Evaluation Group (TAEG) under the auspices of the Chief of Naval Education and Training.

Like any large inter-service meeting, the conference required the efforts of a number of individuals. The success of the conference is due to the time and talents contributed by these people. Key support was provided by the following TAEG personnel:

Mr. Clarence J. Papetti - Conference Chairman

Mrs. Karen D. Lam - Conference Coordinator

Dr. Alfred F. Smode - Director of TAEG

Mr. Thomas McNaney - Audio-Visual Support

Ms. Ann Buschbaum - Conference Registration

Ms. Susan Gates - Conference Registration

Mrs. Willie Keith - Preparation/Conference Proceedings

Mrs. Elinor Flynn - Preparation/Conference Proceedings

Appreciation is expressed to personnel of the Technical Information Division of the Naval Training Equipment Center, Orlando, Florida for conference publicity and to personnel of the Naval Training Center, Orlando, Florida, for providing conference facilities support.

The strong participation and interaction among the conferees is acknowledged. Their enthusiasm and interest made the conference a stimulating and worthwhile experience. Altogether, about 100 people attended one or more of the paper sessions.

Appreciation is also expressed to the U. S. Navy representatives who participated in the Workshop Session after the completion of the conference, especially to LCDR Gerald Griffin who served as Chairman of the Workshop Session.

Finally, special thanks are due to the authors of the papers presented and to the organizations with which they were affiliated.

PREFACE

This volume presents a series of papers read at the conference on "Military Instructor Training in Transition," held on 15-17 January 1975, at the Naval Training Center, Orlando, Florida. The conference was hosted by the Training Analysis and Evaluation Group (TAEG) of the Chief of Naval Education and Training. The purpose was to bring together people involved in instructor training from the military services, industry and academia to exchange ideas and to discuss mutual issues, problems and trends in producing effective instructors.

The conference was conceived as part of the TAEG program of study on Navy Instructor Training. The objective of this program was to identify changing requirements for instructor training and to provide recommendations for the design of the instructor training system of the future.

Two major themes were developed during the first two days of the conference. Objective I focused on instructor training programs in today's military environment, highlighting current practices, trends, constraints and problems. Plans and/or funded programs of the immediate future were articulated and the qualitative changes projected for the next generation instructor training system were outlined. The changing role of the instructor resulting from increasing sophistication in instructional delivery systems was examined (i.e. emphasizing a retreat from the view of the instructor simply as an information delivery agent to that of regarding the instructor as a multi-media manager and training strategist).

Objective II centered on innovative concepts and ideas relevant to the long-range planning for instructor training. Prescriptive inputs were sought which could be incorporated into an idealized design of an instructor training system appropriate to the final quarter of this century. These would necessarily encompass the changing military and social environment and the predicted advanced technology of the future. In addition, the Navy attendees convened on the last day of the conference to examine the possibilities and outline the objectives for a CNTECHTRA-sponsored workshop on instructor training.

We are witness to significant and rapid changes in the military training establishment. These range from the compelling movement to substitute synthetic training for training in actual environments (e.g. flight simulators as the surrogate for in-flight training), to qualitative changes in the schoolhouse environment. The whole issue of change and the mechanisms which bring about change is of growing concern to the training establishment. The conference reflected this awareness for needed change in thinking and operation.

Leading training practitioners were invited to describe current programs or to record their views and beliefs on what should be, or is yet to come. In essence, the contributions of man vs. machine presentation of instruction were highlighted. Considerable attention was given to examining the humanizing values, the richness and sensitivity resulting from the man in the loop and to the values accruing from machine organization and control of instruction made possible by a burgeoning technology.

A range of topics was covered by the heterogenous group of specialists and significant variations exist among the papers, both in content and approach. However, the editors have not tampered with the authors' style or points of view. Also, the views expressed herein are those of the authors and not necessarily those of the organizations with whom the authors are associated.

A result of this conference is, hopefully, a series of snapshots which realistically depicts facets of the business of Instructor Training.

A. F. SMODE
K. D. LAM
Editors

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INTRODUCTORY ADDRESS

Captain Bruce G. Stone
Director, Education and Training Research and Program Development
Chief of Naval Education and Training

I usually open with a baroque trumpet fanfare but the Navy school of music has not completed their task analysis on baroque trumpet fanfares, therefore we had to dispense with the drama. Also, heralds are undergoing a rating consolidation with the heavy equipment operators so even if Vivaldi's original concerto scores that I had ordered had arrived, we still would have been without the colorful openings I had planned; however, Dr. Smode has captivated you with a brilliant display of oral penmanship so, with the niceties aside, I shall procede to the enviable task of setting a keynote for this conference.

In a recent monograph entitled "Remarks for Any and Every Occasion," I came upon a footnote which stated "A Rule of Mouth" for keynote speakers--use one of the following openings:

A. A Biblical quotation

B. A humorous anecdote

C. Announce a change in the topic of the conference

I have elected option C and thus take the keynote speaker's liberty of changing the title "Military Instructor Training in Transition" to "Military Instructor Training in Transition to What" and it is my position that the "To What" should really be the focus of this conference and the results should provide some definition of the transit that the instructor training must make if it is to satisfy the requirements of the years ahead. In my search for an appropriate opening, I couldn't find a Biblical quotation, so I took the liberty of borrowing from the Torah this observation: "For a man who doesn't know where he's going, any road will take him there" and thus I would enjoin you to consider that the purpose of this conference is to determine where it is we are going so that we can lay out or choose the appropriate road. I am attempting to cope with, as Einstein so nicely put it, "the great unsolved problems of mankind" and in this instance, and in my world of education and training research and instructional program development, one of the great unsolved problems is the instructor. How does he fit into instructional program design? Where does he function in the instructional system? I think we would do well if we addressed a fundamental and philosophical issue of the role of the man in the system with considerable precision and detail. Technologies have been developed to provide for virtually any learning requirement, rigorous and disciplined methods and techniques are available by which the desired performance can be achieved. So to bring philosophy and theme into focus let

me address the key words in the conference title: instructor, training, transition, and military.

The term instructor raises a whole host of issues dealing with man/man, man/machine, and man/system relationships in a learning experience. What are the functions? What are the tasks? What are the skills? What are the conditions under which they are to be performed? What are appropriate indicies of proficiencies? How is it best acquired? And how is it best maintained?

The term training, of course, calls up all of the philosophy, policy, procedures which have been developed and gathered under the rubric of instructional technology and I hope that the very best and most appropriate of that technology will be applied to the training of military instructors. Transition very simply means movement from something to something and specifically, in this issue, we are talking about change. When one contemplates change, one must inevitably deal with the conflicts that change creates.

The last term, military, tells something about the environment in which the change is to take place but it leaves untold at least as much as it tells. It would be well for us to carry with us an awareness that the military is changing and that few of us have experience in dealing with the kinds of change which the all volunteer services will bring.

So, to pick up on an earlier point, what are the philosophic issues relevant to this conference? Any of you can name a dozen in a minute or less and it's highly likely they would all be relevant and legitimate. But for us to attempt to deal with the central and peripheral philosophies which relate to military training and specifically, military instructor training, in a brief two days would be naively ambitious. Therefore, I would like to deal with one philosophical issue -- to me a primary and basic issue -- that is in our well intended efforts to apply modern instructional technology for which you may read instructional systems design, development, systems approach to training, etc., are we allowing technology to shape our needs or are we shaping technology to our needs? In my view, we're at a critical juncture in our military training development. The manner in which we resolve the issue of technology versus needs or perhaps needs versus technology, if in fact we do resolve it, has great meaning and will yield certain direction for us in addressing not only today's and tomorrow's undertaking but the whole program of military instructor training for the years to come.

Let me again return to the four elements of the conference theme; instructor, training, transition, and military. In the instance of the instructor, we have made a conscious commitment to change the traditional role of the instructor from the lecture/demonstrator, classroom conductor to something else and the query is, what is that something else?

Obviously it is a person who somehow functions in whatever instructional program is developed for whatever learning requirements are stated. If we call out some of the terms current in instructional technology such as diagnostive, prescriptive, adaptative, multi-media, criterion referenced, individualized, self-paced, computer managed, computer assisted, we begin to perceive a multiplicity of roles and functions for the instructor and the mind soon fills with apprehension about the ability of the hundred and sixty-five pound servo mechanism which is mass produced by unskilled labor, to provide a vital system element with the capabilities and capacities that all those terms suggest may be required. Personally I am not dismayed at the prospect of being required to provide training to meet those multiple requirements. One might even consider that historical models exist which encourage us in our effort. The leading seamen and bo'sun mates of John Paul Jones' Navy were adept in all of the tenents of modern instructional technology - task analysis, training analysis, instructional program design, individualization, prescriptive, diagnostive, etc. In comparison with today's sophisticated learning centers, the focsle of a sailing man o'war with a gnarled and grizzled bo'suns mate as the military instructor is crude indeed, but he was able to diagnose the ineptness of the landsman shanghaied from the waterfront saloons and to apply it with a belaying pin or the bitter end of a line. Individual instruction had a pace appropriate to the learner's agility, sobriety and dexterity. This illustration is not entirely facetious because we are in fact dealing with that vital element in our learning system, the person who functions in that vague and now ill-defined region between the system and the learner. The traditional role as we have said is being abandoned. The new roles must be defined and the needs of those roles must be established and people to function therein must be trained, which leads us to the third and probably in light of our instructional technological development, least problematic area. I would be considered, I'm sure, a heretic, if I did not enjoin you to apply the same sorts of tenets and precepts of instructional technology to instructor training as one would to guided missile or data systems training, the familiar algorithm of task analysis, training analysis, instructional program design and development and evaluation, but it must be applied with the query, are we fitting the technology to our needs or our needs to the technology? And the last term, military, must be closely examined for implicit and explicit assumptions and constraints. The character of a military man or woman is changing as the character of our larger society changes and as always, there are unique features of training in the military to which we must address attention. Of primary concern to you should be the fact that the Navy traditionally has observed the practice of one-time, brief, two to three year assignments of officers and men to instructor duty. We have no instructor speciality, no instructor corps, less than a third of our instructors are volunteers for the duty and fewer than one in ten repeat tours as instructors. Again the issue of shaping our needs to technology and practice or, shaping technology and practice to our needs, is relevant. So as we open this conference, I think we can legitimately view ourselves

as being at a critical decision point. Do we fit the system to the man? Or vice versa? And the irony of our situation is that we in the behavioral sciences, I think, are guilty of the same transgression for which we have so often indicted the physical scientist. We have developed a technology and now it appears we must find or fashion people and populations to fit that technology. But perhaps it's not too late to change the situation and I would suggest that as you proceed and consider the issues for the next two or three days that you firmly apply the principle that technology should serve man's needs. Man should not serve his technology, that needs should not be determined by the state of the art but rather by the state of the man. Perhaps now, here, we can begin to identify the human needs and qualities in the man instructional system equation and determine in a forethoughtful, pro-active, logically fashioned manner, what the needs and capabilities of military instructors will be in the last decades of this century and fit the technologies known and developed to meet those needs. That's what I think this conference is all about.

KEYNOTE ADDRESS

THE ROLE OF THE INSTRUCTOR AS A HUMAN BEING

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It is quite possible that when the wheel was invented, some visionary doomsayer prophesied that it would eventually make human labor unnecessary and obsolete. This kind of prediction was certainly associated with the Jacquart loom, the steam engine, the typewriter and more recently the computer. Breast-beating seems always in fashion and lurid portraits of doom attract large audiences.

A summary of my unromantic philosophy about systems, machines and people and jobs goes about as follows. People will be needed to clean up the messes created by systems and machines, and the bigger the systems the bigger the messes. The competences and abilities and motivations of most people--whatever their role or job--are rather mediocre (the pun is intended in the pejorative sense) and a sea of mediocrity is like warm jello: the content may move around a bit from place to place, but little change really occurs. This dismal conclusion seems especially to fit the role of instructor in recent history who has been peculiarly exempt from the natural law of non-survival of the non-fitting.

An analytic look at history can be enlightening. Simpler prototypes from the past may give us ideas for the present and future. Imagine, please, a primitive society living in a barbaric wilderness with tools and weapons of stone or bronze. Imagine now the relationship of father as teacher to son who is student. Instruction is given in the arts of physical and social survival. "Survival" in this context means literally living rather than dying.

The father-teacher would be the somewhat forgiving surrogate of harsh natural experiences to the child. He would teach the tasks and strategies of survival technology: hunting, farming and warfare. He would also teach the societal technology: the rituals, beliefs, values, attitudes and formats for social interaction that conferred role and identity in the family and tribe. These roles provided dependability on the collective human resource, and thus stability against natural and human attack. Societal technology was therefore also a survival objective associated with living and dying.

Let us take note of the salient factors in this prototype of teacher-student relationship.

1. The symbiotic relationship: the teacher himself depended sooner or later on the productivity of his student as hunter, farmer, warrior and respected member of his tribe. The teacher had a real stake in the outcome of his teaching.

2. Action (or task) reference for what was to be learned: environmental and social survival.

3. Survival-of-the-fittest teaching: the criterion of instructional effectiveness was physical and social survival, thus the opportunity to reproduce offspring and repeat the instructional cycle. The children of poor instructors would tend to die out faster than the children of good instructors. The child as adult would teach as he was taught.

4. Motivations to teach well and learn well intrinsic to the task situation rather than extrinsic and artificial.

5. Initiatory rites as proficiency tests: the conferring of manhood and social identity as a direct outcome of competence.

Let us translate these factors into the key technical problems in our contemporary picture of instruction.

1. Motivations of teacher to teach and learner to learn: mutual trust and sharing of levels of aspiration.

2. Well-defined objectives and criteria of learning: the relevance of what is taught to the tasks which the learner will perform.

3. Individualized instruction with sequential organization of progress in what is learned.

4. Operational tests of proficiency and direct feedback of relevant signals plus interpretation of how the situation, the response and the outcome are all related to each other.

5. Progressive shift of action initiatives from instructor to learner.

6. Natural elimination of ineffective and irrelevant instruction.

Unfortunately item 6 is not generally recognized as a key problem in today's picture of instructional issues.

Shift the picture to guilds and apprentice training. The teacher is a model, but the relationship to the student is only temporarily symbiotic. During his apprenticeship the student is cheap labor. Instruction would therefore be task-referenced. But at the conclusion of

his apprenticeship, the student becomes a potential competitor to the teacher. This anticipation will dilute the intimacy of teacher and student beyond various limits in the instructional relationship. Beyond the limits required for apprentice labor in the workshed, the instructor will lose interest in efficient instruction.

Now shift the picture to scholasticism. Here is the acquisition of symbolic knowledges without clear task and skill references. The wedge is driven between the academic and the pragmatic, between knowing and doing. Knowledge and rules are learned for their own sake, and pedantry becomes an art form. Learning and teaching become institutionalized and survival strategies become directed to status and roles within the institution. The result is the gentleman-scholar and the priest-scholar. The word and the deed are no longer linked by pragmatic reference. Education splits off from training, but the two will continue to be confused for centuries.

Let me emphasize that my objective in these thumbnail sketches is not to condemn but to reveal archetypical roles of the instructor and student. My views about the values of general education are quite irrelevant here.

The role of the contemporary school instructor is still didactic today. He purveys information about things and phenomena and is a preparer of students for official examinations. He administers and grades tests, and is absolved from substantive criteria on his effectiveness by giving grades on relative student rank in performance. The student performance criteria are themselves largely subject matter referenced rather than rooted in behaviors and performances external to the academy. Instructional technique is institutionalized and embedded in elaborate machinery. This machinery at present seems to incorporate the conditioned response paradigm of learning. Since the institution is, like the Church, a relatively closed monolithic system with respect both to objectives and to technique, reform is, if not impossible, bound to be slow.

But in the future, it may become cheaper to use mechanization to apply the conditioned response paradigm in rote drill on facts, routine procedures, rules and paired associates tables of data. Simulators may, in the interactive mode, instruct on concepts, principles and even strategies in the context of various models of the phenomenal world. But instructional simulators used by every student as an interactive graphic terminal are not at all in the near future (except in geological time) because of the forbidding programming effort required of them and the massive system facilities incurred by them.

So what roles will remain for the instructor when this millenium comes to pass? Pretty much the same ones he ought to be playing today,

if we acknowledge that the bulk of student learning is not from the instructor's lecture itself, but from study of notes made from lecture, and from textbooks and workbooks.

The instructor should now and in the future combine the properties of a compassionate human being with the creative skills of the artist-craftsman in fabricating instructional communications that are interesting, illuminating and memorable. As a human being, his role is the psychologist's textbook characterization of the leader: perceptive both of the subordinate's psychological needs and of the goals to be achieved; alternatively permissive and autocratic; controller of cycles of intensifying and easing of work pressure; reducer of uncertainties.

The following paragraphs outline these functions and roles.

Focus interest. As artist-craftsman vis-a-vis collections of students, the instructor's presentation is a performance in the theatrical sense. The competent actor, by the way, does not emphasize himself as a person: he emphasizes the role and the subject matter he is portraying. As a performer he can focus and sustain interest with a forcefulness that must be admittedly rare in an inanimate machine--that is, a device without flesh and blood and the capacity for audience identification. Interest is sustained by making what is presented exciting to watch and listen to. Excitement is a condition of the audience, but is contagious from the performer. (Can you remember when you last had a teacher who was excited by what he was teaching?)

Dramatize for recall. Attention and arousal are necessary, but not enough. The performer can dramatize the content in a way that facilitates recall. When the instructor writes the word "THEATRICAL" on a blackboard before an audience, a different communication is made than if the same word were presented by a slide projector. The performer, attuned to his audience, senses when to underscore, pause, repeat, paraphrase or find another example.

On the matter of physical presence, observe that the pianist Horowitz plays to sell-out audiences in Carnegie Hall even though recordings of his performance can be bought for half the price of a good ticket.

On the matter of lecture presentations, there is, by a curious inversion of empirical data, acceptance of the notion that little or nothing can be learned by students from lectures. To be consistent, then, why do we waste our time coming to conferences to hear speakers? The fact is, we do learn little (by definition) from poor lectures and poor lecturers, just as we learn little from poor CMI material.

Human guidance, interaction, encouragement. The student, too, is a human being as well as a learner. He periodically becomes discouraged, overloaded, distracted. Or he may become over-confident,

hostile, or rambunctious. If the condition is transient, the instructor as leader may read the advance warnings and act to avert the crisis, or hasten the student through it when it arrives. In learning a complex skill or body of information there are more or less predictable stages where temporary discouragement occurs. The instructor is not a counselor: this is too formal an expression for what is more appropriately extemporised. The instructor as leader may also underline what is important to learn very well as distinguished from the less important in a large body of presented content and context. He identifies and organizes the key operative information from supporting context, and by temporarily simplifying what is to be learned, encourages the student to keep trying.

Level of aspiration for achievement. The sights set and sustained by the student on the range and levels of the skill he hopes to achieve may be inappropriately high or, more frequently, too low. Or the level of aspiration may fall during the hard work and frustrations of the learning process. It is likely that only the vital, interactive presence of a trusted human being can raise flagging aspiration levels so that the student's reach continues to exceed his grasp. It should be obvious that no mere sales pitch made during the indoctrination period can have continued substance and leverage over weeks and months of hard work. The drive to mastery for at least many students needs occasional transfusions of nourishment.

Design of training content. This function of the instructor is not continuous with the previous series, but is related to all the items. It is designing the content of the communication which transmits the stuff to be learned. It consists of the words, images, analogies, visual patterns that make one exposition of a content or exercise richly meaningful, enriched and cumulative in effect, from another presentation which is dry and lifeless. The comparison of a good textbook today with one considered good on the same topics fifty years ago will provide an example of the difference. What I am emphasizing here is the communicational effectiveness for learning, remembering, generalizing and transferring a content. There are some of us who believe that the design of training content at the presentational levels is more important to learning than an entire handbook of pedagogical rules about spaced versus massed practice, how many words to put on a frame, exposure rates, feedback delay and so on. On occasions that can be cited, a single right phrase at the right time had more instructive significance to learning than an attempt to express the phrase in a chapter of text. The design of training content can challenge the highest levels of creative and insightful talent. The challenge applies to instructional communications for learning to make instrument landings on a carrier in heavy seas or for learning to

use a screwdriver effectively.

Perhaps not many instructors have this creative gift, or express it spontaneously. It may be cultivated by some who are given incentives and a gallery of examples and perhaps half a dozen guiding principles.

Coaching. Examples here are the football coach to a professional team or the singing coach to a professional singer. The coach helps the student bridge the gap between an acceptable level of skill and virtuoso performance. He adapts the capabilities of the individual from the training environment to the operational environment: he mediates and facilitates transfer between training and operations. He seeks out individual aptitudes and capitalizes on them. He guides aspirations, integrates individuals into teams, generates individual initiatives. He will teach the strategic components in the exercise of skills that enhance success probability when the going is rough and the limits of skill and of system capability are tested. Strategies may be directed towards the operator's more effective use of himself as a device; or towards the more efficient use of the things he works with; or towards better coping with conditions of risk and uncertainty. Another class of strategy applies to the operator's efficient use of work experiences as continued learning experience, not merely at the conditioned response level, but at the cognitive thinking level as well. Inevitably the coach transmits, directly or indirectly, values and attitudes about performances and criteria that are beyond what can be done by mechanical communication.

Coaching may be a job, or it may be a role which an instructor can play during many stages of skill development. The way it is done--like any form of leadership--will reflect in part the personality and style of the individual. At least up to a point, this individuality is useful in creating human credibility and trust. At no other level in training is personal as well as technical trust in the instructor (in the subjective sense) so essential to the learning process. It is not necessary for the coach to have, or have had, the levels of skill he is coaching. But he must be intimately aware of the ingredients of those skills and the limits of what can be achieved.

Shaper of key persons. Many organizations have one or two individuals with the knack of doing the difficult, of pinpointing a trouble when others have given up, improvising workable solutions to problems out of baling wire, locating the out-of-stock item, initiating productive action when the others despond. The person who always seems to know what he is doing. This person often is not the nominal leader of the group; his leadership may be situational and technical. He becomes the key person when things go wrong or the situation is difficult and uncertain. The competence of such persons may or may not be highly specialized: but they tend to be generalists.

The perceptive instructor can usually identify the rare student with potential for being a key person in his organization. He may not be the best student in terms of grades--he may even seem slow in learning some academic materials. There may be no standard aptitude profile for spotting this individual, perhaps because his personality is interwoven with his abilities.

If he is not socially dominant or verbally fluent, the potential key person tends to be lost overly long in the shuffle, both in school and on the job. This is demoralizing to him and a loss to the organization. The perceptive instructor could mitigate both liabilities by serving as a mentor, teaching what cannot be programmed into formal instruction, and encouraging initiatives even when they conflict with conventional progressions. Enabling the maverick to extend and control his talent without losing his practical intiatives can be a key role for the instructor where both the training and the operational scenes are filled with mechanical mediocrity. If the student appears to fulfill the instructor's intuitions, he may be flagged for appropriate recognition (in spite of his academic grades if necessary) when he is placed into operational work. Because these individuals do not fit a standard characterization, their attributes may have to be uniquely identified.

These comments should underline the following predictions. The roles of the instructor of the future will be at least as important as those of today even in an environment of individualized learning. In almost all respects, he will be playing the same roles in the future that he ought to be playing today, except for some clerical and mechanical activities that he ought to be glad to be rid of. Instructors who have been able to do only the mechanical things -- playing non-human or inhuman roles -- will be released to other work, to the relief of students, training administrators and their more competent colleagues.

As a final comment, the instructor may be part of an assembly line operation. If he is, he is vulnerable to more cost-effective devices. To the extent that learning -- as contrasted with training -- is individual and unique, and to the extent that learning is in part a social phenomenon, there are roles to play for the instructor as a human being. The fulfillment of these roles calls for wisdom and conceptual insight as well as the technical knowledge of the textbook or animated textbook, and of communications that are not merely didactic but are also vivid and, on occasion, compassionate.

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OBJECTIVE I INTRODUCTION

The goal of Objective I is to examine instructor training in today's military environment. A sampling of current programs is presented which highlights on-going practices in the various services. Emphasis is placed on trends, constraints and problems of mutual interest in the military.

Plans and/or funded programs of the immediate future are articulated in order to provide a blueprint outlining instructor training requirements and the changing role of the instructor. Emphasis is placed on the qualitative changes projected for the next generation instructor training system.

The initial presentations in this section center on current practices, philosophies and operations in the military services represented and variously describe organizational relations, course outlines, staffing, student throughput and instructor career structure. Subsequent papers address plans and programs of the immediate future relative to instructor training.

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CURRENT U.S. NAVY INSTRUCTOR TRAINING PROGRAM

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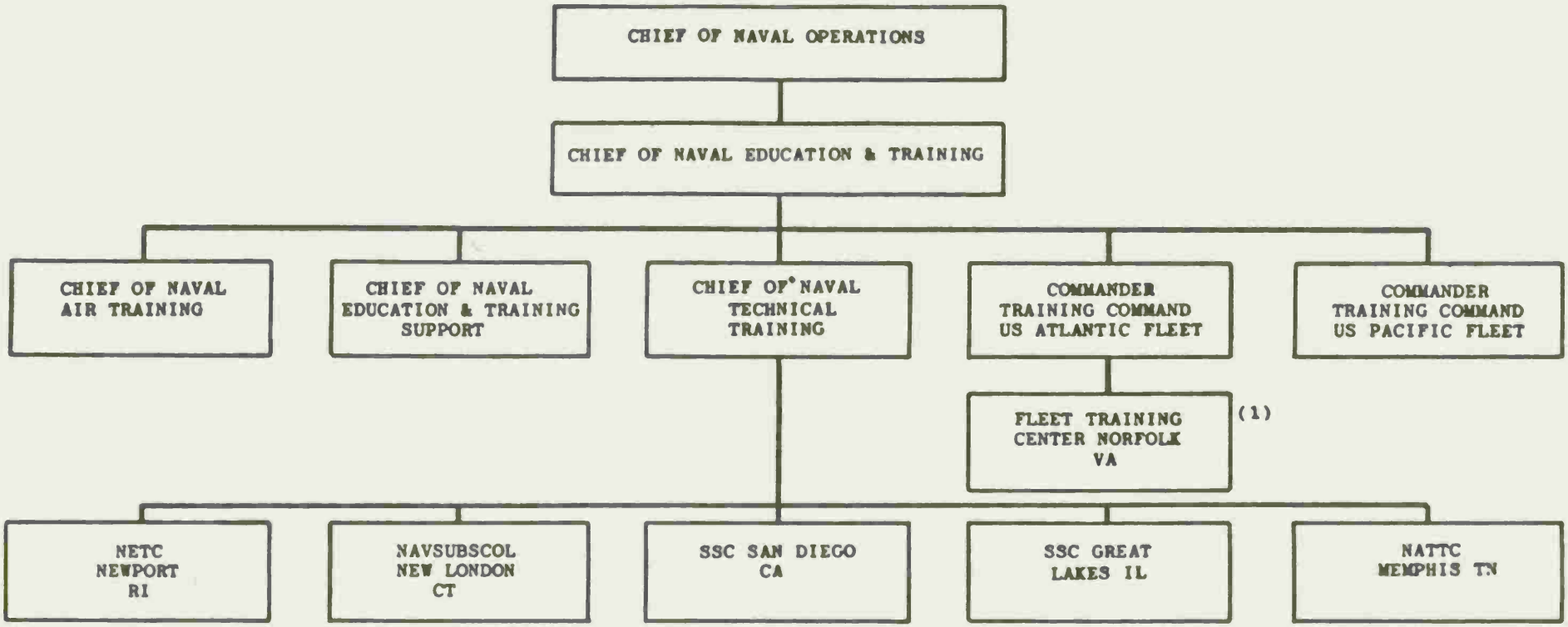
Chief of Naval Technical Training

Introduction. For many years instructor training in the U.S. Navy has been an important component of the training effort. Experience has shown that regardless of the quality of the course materials, the logistic support provided, or the training aids available, effective instruction takes place only when instructors have received adequate training. Properly qualified instructors are vital to the technical training effort in the U.S. Navy. The objective of this report is to provide a general overview of current U.S. Navy technical instructor training.

Organizational Relationships. Figure 1 has been prepared to aid in understanding the organizational relationships involved in Navy Instructor Training. The Chief of Naval Operations in the Navy's Washington Headquarters has responsibility for overall operation of the Navy. The Chief of Naval Education and Training based in Pensacola, Florida, as the Navy's major training manager provides broad training policy guidance. Subordinate to the Chief of Naval Education and Training are five functional commanders responsible for specific areas of naval training. Two of these functional commanders are directly involved in technical instructor training. The Chief of Naval Technical Training based in Millington, Tennessee coordinates and directs all shore based Navy Technical Training and exercises direct command over the units providing instructor training with the exception of the Fleet Training Center, Norfolk, Virginia, which is a subordinate of Commander, Training Command, U. S. Atlantic Fleet. The Chief of Naval Technical Training has been assigned curriculum control for all instructor training courses. Curriculum control is defined as the authority to determine instructional content, sequence of presentation, course length, etc. There are six commands at which technical instructor training is taught. Naval Education and Training Center, Newport, Rhode Island provides instructor training primarily for officer personnel who instruct in the Navy's Officer Candidate School and other Navy training activities in the Newport area. Naval Submarine School, New London, Connecticut, prepares instructors for support of submarine training and has some special curriculum considerations to meet the special needs of the Submarine Training System. Service School Command, San Diego, California, is the largest instructor training school in the Navy. This school provides instructor training support for west coast Naval training activities and has been designated the curriculum manager for Navy Instructor Training. Fleet Training Center, Norfolk, Virginia, provides instructor

INSTRUCTOR TRAINING ORGANIZATIONAL RELATIONSHIPS



NOTES: (1) CHIEF OF NAVAL TECHNICAL TRAINING EXERCIES CURRICULUM CONTROL OVER INSTRUCTOR TRAINING CONDUCTED AT FLEET TRAINING CENTER NORFOLK VA

FIGURE 1

training support for east coast Naval training activities. As noted earlier, Fleet Training Center, Norfolk is a subordinate of Commander, Training Command,U.S. Atlantic Fleet. The Instructor Schools at Service School Command, Great Lakes, Illinois, and Naval Air Technical Training Center, Memphis, Tennessee provide instructor training in support of Naval technical training conducted in those geographical areas.

Course of instruction. Instructor Training in the Navy consists of three courses of instruction: (1) Instructor - Basic, which is attended by all personnel filling designated instructor positions; (2) Instructor-Shipboard, which provides instructor training for personnel filling shipboard or operational unit instructor positions; and (3) Programmed Instruction Techniques, which provides training in programmed instruction writing to selected, experienced instructors. These courses are taught in the locations shown in Figure 2. It should be noted that the Instructor-Shipboard Course is taught in areas of fleet concentration. Programmed Instructor Techniques is taught at those locations which have the greatest need for programmed instruction writers. Each course of instruction will now be discussed in greater detail with emphasis on the Instructor-Basic Course.

Instructor-Basic Course. This course is designed to provide the knowledge, skills and basic motivation necessary for effective job performance by personnel assigned as instructors. Figure 3 provides the course training sites, course length and other operational details. The percentage figure shown behind each training location is the percentage of the Navy total yearly student input trained at that site. The yearly student training input plan for FY 73 through FY 76 is shown by the bar graph. Operational details such as class size and convening frequency vary at each site. In general, the larger instructor training activities such as Service School Command, San Diego; Fleet Training Center, Norfolk; and Service School Command, Great Lakes convene weekly classes with an average class size of about 25 students. The smaller instructor training activities convene classes on a two to three week interval with a class size of 10-12 trainees.

Curriculum Revision. For the past three years the Navy has been involved in a major curriculum revision for the Instructor-Basic Course. This revision was necessitated by changes in Navy training philosophy. Use of the systems approach to curriculum design and the Navy's commitment to individualized learning were the principal factors leading to the revision. Figure 4 indicates the major milestones during the curriculum revision. The Navy is now in the final stages of implementing this curriculum in the six instructor training schools. An Outline of Instruction provided in the course is shown in Figure 5.

Instructor-Shipboard. Another course taught as a part of Navy Instructor Training is Instructor-Shipboard. This course is designed to provide Navy personnel with the basic principles of instruction and train them in

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INSTRUCTOR TRAINING LOCATIONS

INSTRUCTOR BASIC	INSTRUCTOR SHIPBOARD	PROGRAMMED INSTRUCTOR TECHNIQUES
SSC SAN DIEGO	SSC SAN DIEGO	SSC SAN DIEGO
FTC NORFOLK	NORFOLK	FTC NORFOLK
SSC GREAT LAKES	NAVSUBSCOL (1)	SSC GREAT LAKES
NETC NEWPORT		NATTC MEMPHIS
NATTC MEMPHIS		
NAVSUBSCOL		

NOTES

(1) NAVSUBSCOL WILL COMMENCE TRAINING FEB 1975

FIGURE 2

443
Division/Activity

INSTRUCTOR - BASIC
TRAINING INPUT PLAN

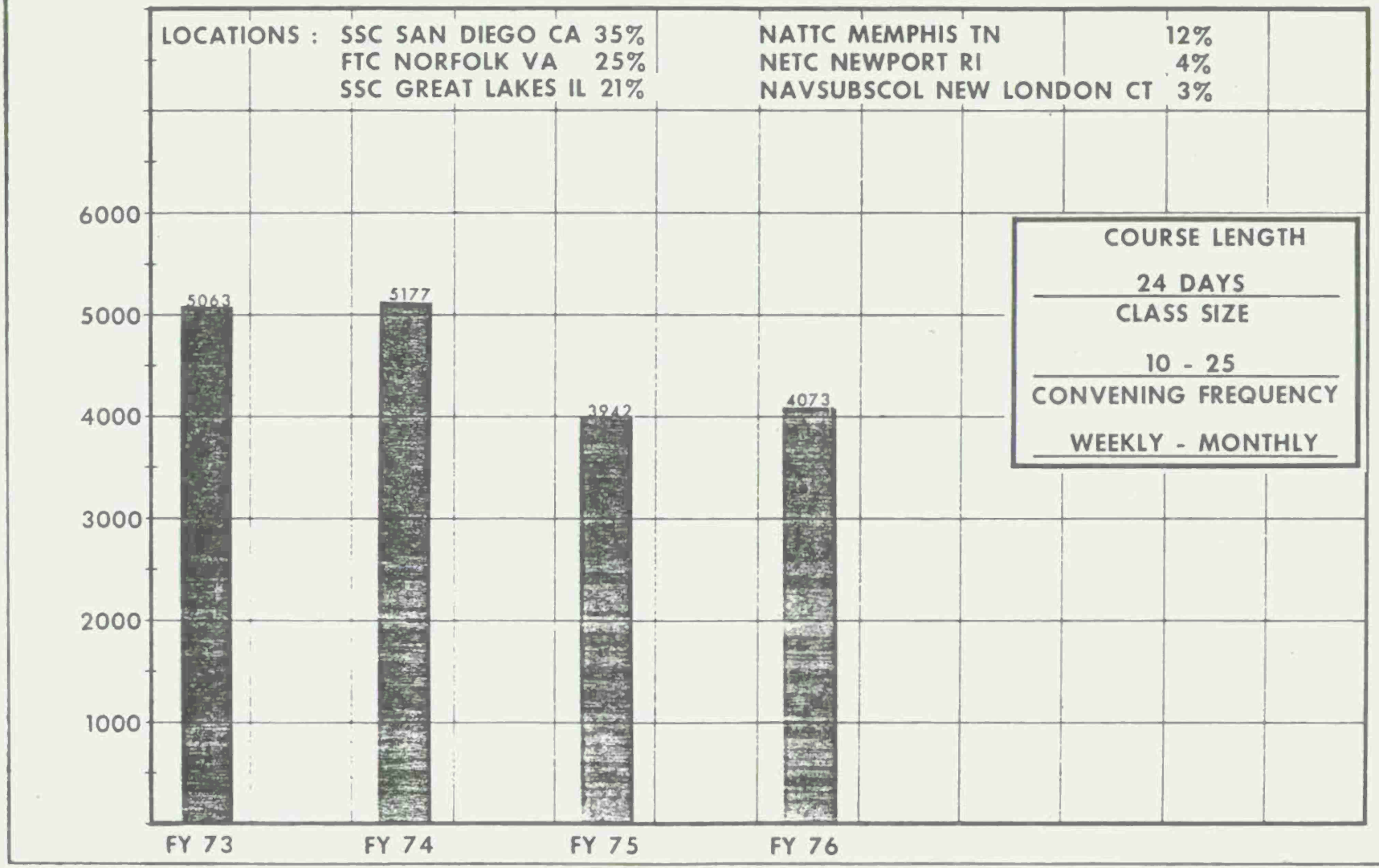

FIGURE 3

443

INSTRUCTOR BASIC CURRICULUM REVISION

FEB 72	PROJECT COMMENCED
JUL 72	JOB TASK ANALYSIS COMPLETED
DEC 72	TRAINING TASK ANALYSIS COMPLETED
MAY 73	INITIAL CURRICULUM DRAFT COMPLETED AND REVIEW PROCESS COMMENCED
DEC 73	FINAL REVIEW WORKSHOP MET
APR 74	APPROVAL FOR IMPLEMENTATION GRANTED

FIGURE 4

INSTRUCTOR - BASIC
OUTLINE OF INSTRUCTION

I. INSTRUCTIONAL PLANNING

- THE FACTORS AFFECTING LEARNING
- TRAINING TASK ANALYSIS
- LEARNING OBJECTIVES AND CRITERION TESTS
- INSTRUCTOR GUIDES
- INSTRUCTIONAL METHODS AND TECHNIQUES
- INSTRUCTIONAL MEDIA AND TECHNIQUES
- CURRICULUM DEVELOPMENT USING THE SYSTEMS APPROACH TO TRAINING

II. INSTRUCTIONAL EVALUATION

- INSTRUCTIONAL COUNSELING
- EVALUATION OF INSTRUCTION
- TEST ITEM CONSTRUCTION

III. INSTRUCTIONAL IMPLEMENTATION

- TWO MINUTE INTRODUCTORY TALK
- FIVE MINUTE TALK
- PRACTICE TEACHING

FIGURE 5

methods and techniques of instruction applicable to the shipboard or operational unit training situations. This course is attended primarily by ship or operational unit personnel and prepares them to establish and effectively operate their own divisional training program in support of Navy general training requirements. This course is taught at Service School Command, San Diego; Fleet Training Center, Norfolk; and will be taught by the Naval Submarine School in New London, Connecticut, beginning in February 1975. This course is two weeks in length, has a class size of 18 and convening frequency varies according to location. The yearly input training plan for this course for FY 73 through FY 76 is shown in Figure 6. The Instructor-Shipboard Outline of Instruction is shown in Figure 7.

Programmed Instruction Techniques. The third course taught as a part of Navy Instructor Training is Programmed Instruction Techniques. This course provides a thorough grounding in the basic techniques of programmed instruction and develops the trainee's ability to write programmed instructional materials for use in Navy training courses. This course is attended by experienced instructors who are subject matter experts. This course is taught at Service School Command, San Diego; Service School Command, Great Lakes; Fleet Training Center, Norfolk; and Naval Air Technical Training Center, Memphis. The course length is 19 days. The class size is generally small with about six to ten trainees and class convening frequency ranges from monthly to once every two months. The input training plan for FY 73 to FY 76 is shown in Figure 8.

Conclusion. The design and redesign of curriculum is a continuous process if training is to remain viable. Although the Navy has made significant improvements during the past two or three years in instructor training many areas still remain where improvements can be made. To further improve instructor training, the Navy presently has several intiatives underway which will be addressed in greater detail in Mr. Earl Griswold's paper.

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Division/Activity

INSTRUCTOR - SHIPBOARD TRAINING INPUT PLAN

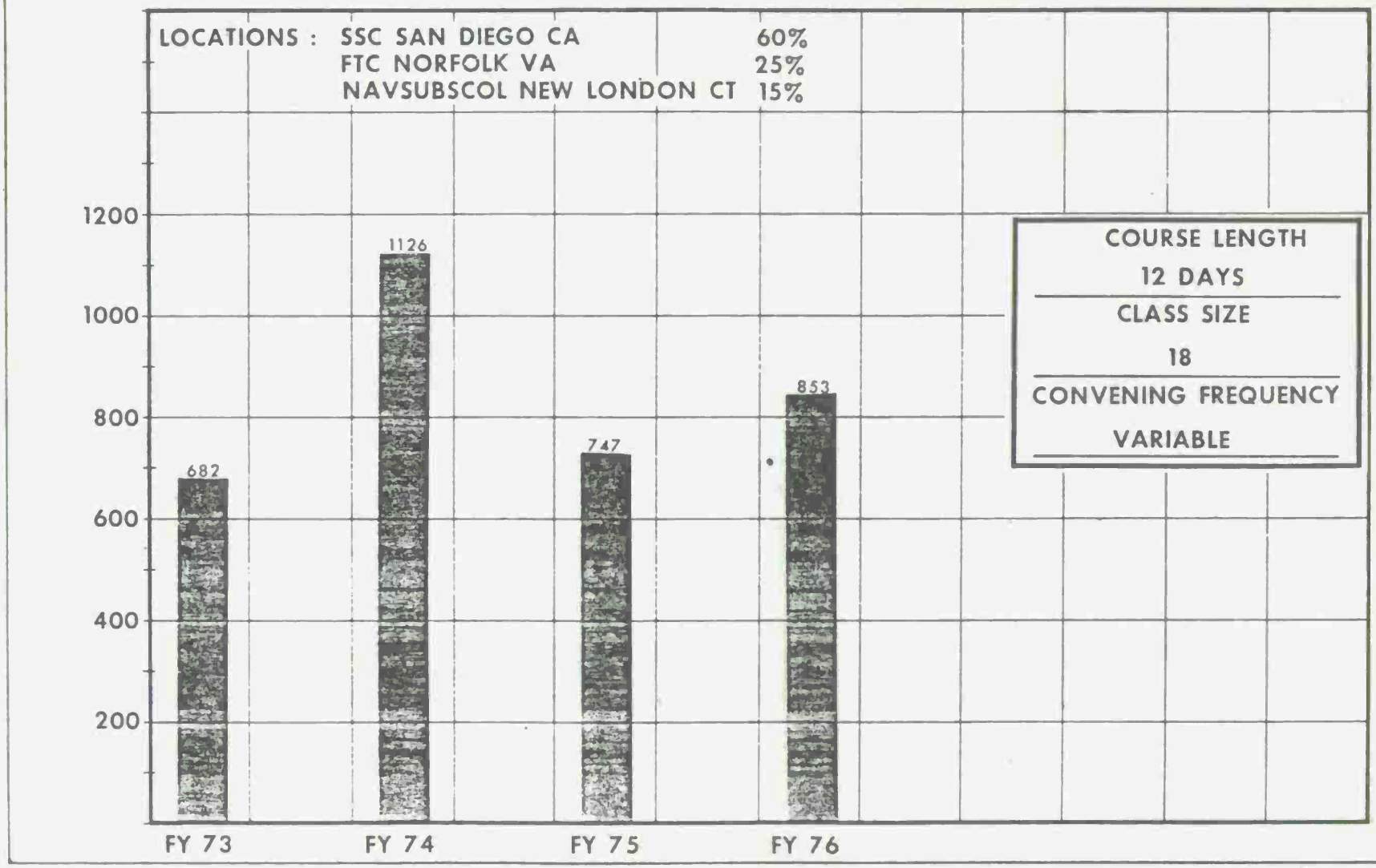

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FIGURE 6

INSTRUCTOR - SHIPBOARD
OUTLINE OF INSTRUCTION

I. INSTRUCTIONAL PLANNING

- THE FACTORS AFFECTING LEARNING
- TRAINING TASK ANALYSIS
- LEARNING OBJECTIVES AND CRITERION TESTING
- INSTRUCTOR GUIDES
- INSTRUCTIONAL METHODS AND TECHNIQUES
- INSTRUCTIONAL MEDIA AND TECHNIQUES
- SHIPBOARD TRAINING PRINCIPLES AND PROCEDURES

II. INSTRUCTIONAL IMPLEMENTATION

- TWO MINUTE INTRODUCTORY TALK
- PRACTICE TEACHING SESSIONS

FIGURE 7

443
Division/Activity

PROGRAMMED INSTRUCTION TECHNIQUES
TRAINING INPUT PLAN

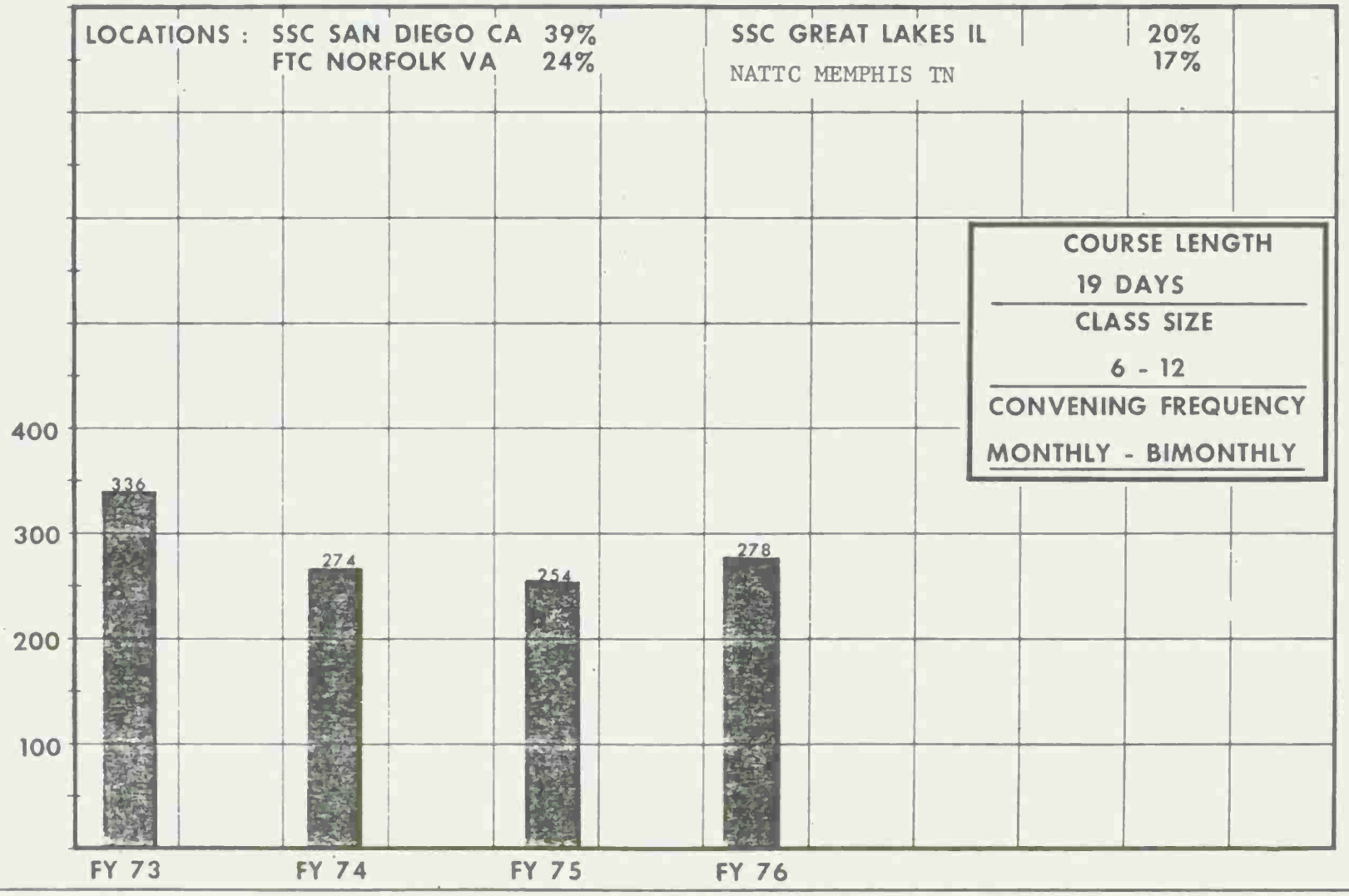

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FIGURE 8

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CURRENT INSTRUCTOR TRAINING IN THE U.S. MARINE CORPS

Lt Col Calvin M. Morris, USMC
Director, Instructor Training School
Marine Corps Development and Education Center
Quantico, Virginia

Instructor training has been an integral part of the various schools within the Marine Corps for over 30 years. There are currently three instructor training schools in the Marine Corps. These are located at Camp Lejeune, North Carolina; Camp Pendleton, California; and at the Marine Corps Development and Education Command, Quantico, Virginia. All three schools provide instruction dealing with the various aspects of instructional methods, but from there, the curricula vary. This paper will deal with the Program of Instruction provided at the Instructor Training School, Marine Corps Development and Education Command (MCDEC), Quantico, Virginia.

The school was initiated by special order dated 25 October 1944. That order set forth the purpose of the course as, "to improve the teaching techniques used in Marine Corps Schools by commissioned instructors. Such instructors will be oriented in the mission, organization, and facilities of the Marine Corps Schools (former title of MCDEC); and in the preparation and presentation of instructional material, to include principles of instruction, public speaking, training aids and publications." The course was two weeks in duration and had a maximum student load of 30.

During the years between 1944 and 1972, courses were added or deleted but the official purpose of the Instructor Training School remained virtually unchanged. Since 1972 we have been guided by systematic instructional design techniques. This in no way has lessened our desire to develop our students' ability to present instruction in an effective manner. We are currently, however, equally intent on developing their abilities in the area of instructional design and management.

To reflect this shift, the mission of the Instructor Training School has been changed and now is, "To train selected personnel to be assigned to supervision and instructional billets in Marine Corps formal schools, the Fleet Marine Force, the Marine Corps Reserve and other services, in the foundations, design, execution and management of systematic instruction. To perform such instructional development as may be directed by higher authority."

Those fully versed with the systems design approach may well question why we provide the instructor with tools to design as well as to present

instruction. Our reasoning is twofold. First, the systems approach was instituted at the Marine Corps Development and Education Command in November 1972. Implementation of the system has been evolutionary rather than revolutionary. Course redesign work has been an additional duty for the instructors and staff members at our various schools, because of uninterrupted classes and a need to learn the system itself. Second, personnel shortages have not allowed for an increase in personnel who could devote their entire attention to design work. Thus the instructor must be both designer and presenter.

Admittedly there are drawbacks to this approach, but there are also decided advantages. During fiscal year 1975, we will train approximately 300 students in the systematic approach to instruction. This added to those already trained constitutes a strong nucleus upon which to build. Through the efforts of our graduates as well as our own, we foresee the systems approach to instruction being understood and willingly adopted throughout the Marine Corps.

In order to comply with our mission, we provide both formal resident courses and assistance to other commands generally in the form of Contact Teams. Our primary vehicle for training instructors at MCDEC is the "A" Course which is four weeks in duration. The course is designed for personnel assigned to fill primary billets as instructors at Marine Corps formal schools. Approximately 140 hours of instruction, including five formal student presentations, are conducted during the four week period. During the course, each student systematically designs instruction, including the analysis of what is required on the job, selection of objectives, sequencing of content, selection of methods and media, documentation, conduct, validation and revision of instruction.

The ability of the student instructor to communicate his ideas clearly, concisely, and logically, while motivating his fellow students is also stressed. Conventional instructional methods such as lecture, demonstration, guided discussion and self-paced instruction are utilized by the faculty in conducting scheduled classes, and by the student instructors during their instructional practice sessions. Classes consist of a maximum of 24 students. Each class is divided into instructional teams of six students and one faculty member. These teams provide a major source of support and feedback for the student as he progressively acquires the requisite knowledge, skills, and attitudes necessary to provide mastery learning. Six "A" Courses are conducted each year.

The course begins with instruction in Effective Communications which stresses listening habits and effective use of voice and mannerisms. Our students then demonstrate their platform manner by giving two brief three minute presentations. The presentations are evaluated by the other students, faculty advisors, and by the student himself through means of

video tape. This provides us with baseline data on his current ability and allows him to identify his strengths and weaknesses and to develop a plan for improvement.

After examining the philosophical basis for the systematic approach to instruction, we move into the design phase of our course. With the aid of programmed instruction, the student begins an abbreviated job analysis. Utilizing this job data, learning objectives are established and tests developed to effectively measure these objectives.

The student then receives classes on Instructional Methods and Media. He is also provided with a logical procedure for putting a lesson together. After receiving guidance on lesson validation and rehearsal techniques the student prepares to give his first formal presentation.

As a part of his presentation, the student administers a post test to his fellow students. With the results of these tests, he is ready to evaluate and revise his instruction. The results of this revision are critically analyzed by the students, his faculty advisor, and the other members of his instructional team. The student is also guided through the steps of converting his presentation into a self-paced text. His finished product is evaluated and the revision process begins again.

For his next presentation, we ask that he obtain a lesson plan from the school at which he will be teaching. The student must analyze this lesson plan and identify the job performance requirements upon which the instruction is based. If necessary, the student rewrites the learning objectives and the test items. We do this in recognition of the fact that most of our students will inherit existing packages of instruction at their schools and should be able to critically evaluate them. A list of the various classes contained within this four week period of instruction is found in Table 1.

TABLE 1

Four Week "A" Course

Subcourse 0100	Basic Communication Skills
IAC 0101	Effective Communications
IAC 0102	3 Minute Lecture
IAC 0103	3 Minute Demonstration
Subcourse 0200	Instructional Planning and Preparation
IAC 0201	The Marine Corps System of Instructional Design: An Introduction and Rationale
IAC 0202	Analysis of Performance Requirements
IAC 0203	Developing Job Performance Requirements
IAC 0204	Developing Learning Objectives
IAC 0205	Introduction to Lesson Planning
IAC 0206	Instructional Motivation
IAC 0207	Documentation of Instruction
IAC 0208	Developing Learning Objectives for an Existing Course
IAC 0209	Team Leader's Time
Subcourse 0300	Instructional Strategies
IAC 0301	The Guided Discussion
IAC 0302	Methods and Media
IAC 0303	Self-Paced Instruction Workshop
Subcourse 0400	Presentation of Instruction
IAC 0401	Lesson Tryouts
IAC 0402	10 Minute Presentation
IAC 0403	20 Minute Presentation
IAC 0404	30 Minute Presentation
Subcourse 0500	Evaluation and Revision
IAC 0501	Mastery Learning
IAC 0502	Measuring Objectives
IAC 0503	Validation and Revision of Instruction

In order to meet the needs of Marine Corps Reserve Units, a two week course of instruction, the "B" Course, is offered twice each year. The course is designed for personnel assigned to training or instructor billets at the unit level. Approximately 40 hours of instruction and 40 hours of preparation and presentation are conducted during the two week period. The first week of the course is primarily devoted to instruction, i.e., the students are shown, through the use of conventional instructional methods, how to communicate their ideas clearly, concisely, and logically. They are also exposed to the principles and philosophy of learning and the systematic design of instruction.

Using this instruction as a foundation, the second week is devoted to application. During this week, the students design courses of instruction to include: selection of learning objectives, sequencing of instructional content, documentation and validation of instruction. Four formal presentations are given by each student during the two week period. The classes are restricted to a maximum of 24 students which allows for a six-to-one student-faculty ratio. Here, as with the "A" Course, the instructional team concept is used.

These two courses, the four week "A" Course and two week "B" Course, allow us to train approximately 200 instructors per year. This, however, does not constitute our entire output at the Marine Corps Development and Education Command. We also conduct workshops in Instructional Television and course design for schools and departments within the command.

The Instructor Training School also provides assistance to other Marine Corps commands in the form of Contact Teams. These teams conduct design workshops upon request and when time permits. These various courses and workshops are conducted with a relatively small staff. The Instructor Training School staff consists of eight people, four instructors, three enlisted support personnel and one civilian secretary. This does not allow a great deal of flexibility in the conduct of courses and workshops, and severely limits our capability to design and revise courses of instruction. The emphasis must be placed on assisting the student in mastering the learning objectives of the course.

We do not presume, however, to be able to provide every student with the training required which will enable him to design, present, evaluate and revise instruction of outstanding quality. The time available simply does not permit this desirable goal. Each student is evaluated based on his performance level for specific instructional tasks at the time of graduation. This evaluation is sent to the student's supervisor. A copy of our evaluation format is shown in Appendix 1.

The evaluation system used at the Instructor Training School is criterion referenced, not norm referenced. There are no grades awarded

or honor graduates designated. Our objective is to provide the students with the tools they will need to design, present, evaluate and revise instruction. We have found that this system fosters cooperation and mutual assistance among the students and greatly enhances the learning process.

As the technical means used for the defense of our nation increase in complexity, the requirement for formal training increases. Yet at the same time budgetary constraints and cutbacks in manpower demand that every penny allocated toward military training be judiciously spent. We see the systematic approach to instruction as an effective means of achieving this end.

Our course of instruction has proven to be very effective. Plans for the near future include the design of an instructional management course. However, until time becomes available, the training of instructors will and must be our utmost concern.

APPENDIX 1

End of Course Evaluation

INSTRUCTOR TRAINING SCHOOL
Education Center
Marine Corps Development and Education Command
Quantico, Virginia 22134

Student_____Date_____

1. The end of course performance level is expressed in terms of the amount of supervision that should be provided the new instructor. The supervisory levels are defined as follows:

Supervisory Code	Definition
1.	Reserved for other use.
2.	Will require detailed guidance and close supervision in using correct procedures and techniques.
3.	Will require guidance and supervision, mainly on complicated steps of the operation.
4.	Will require little guidance and supervision even on complicated steps of operation; however, the supervisor will check the end product or final result.
5.	Will perform "on his own" unless special problems are encountered; only a random and occasional check of the end product or final result is required.
6.	Will perform "on his own" even though special problems are encountered; only a random and occasional check of the end product or final result is required.
7.	Reserved for future use.

2. There are three types of entries made in the evaluation matrix which follows:

An asterisk (*) indicates the level reached by the student of graduation. This level was determined by an analysis of all Instructional Analysis Sheets and Lesson Post Tests completed on or by the student.

A number in column 1 indicates the hours of instruction provided for tasks that were not actually performed by the students or measured by the school.

The school's level of mastery is at the "3" level of supervision. This is true of all tasks except those that have hours reflected in column 1.

3. In the "Remarks" section the Faculty Advisor will provide a verbal description of the student; an amplification of strengths and weaknesses.

PART I

Performance Levels for Specific Instructional Tasks

(The school's mastery level is "3")

	Supervisory Level							
	1	2	3	4	5	6	7	N/A
1. Participates as a member of a course content review board?								
a. Participates in a Job Analysis.	—	—	—	—	—	—	—	—
b. Determines Performance Requirements.	—	—	—	—	—	—	—	—
c. Selects applicable performance objectives.	—	—	—	—	—	—	—	—
d. Analyzes Criterion Measures.	—	—	—	—	—	—	—	—
e. Analyzes Learning Objectives.	—	—	—	—	—	—	—	—
f. Sequences Course Content.	—	—	—	—	—	—	—	—
g. Writes Concepts of Instruction.	—	—	—	—	—	—	—	—
2. Writes test items.	—	—	—	—	—	—	—	—
3. Writes learning objectives.	—	—	—	—	—	—	—	—
4. Conducts research to select instructional content.	—	—	—	—	—	—	—	—
5. Sequences instructional content.	—	—	—	—	—	—	—	—
6. Selects, develops and uses the following media during instruction.								
a. Audio Recordings (Disc/Tape).	—	—	—	—	—	—	—	—
b. Film, Filmstrips and Slides.	—	—	—	—	—	—	—	—
c. Overhead/Opaque Projections.	—	—	—	—	—	—	—	—
d. Charts, Graphs, Flannel Board	—	—	—	—	—	—	—	—

	Supervisory Level							
	1	2	3	4	5	6	7	N/A
e. Television.	—	—	—	—	—	—	—	—
f. Other _____	—	—	—	—	—	—	—	—
7. Prepares Lesson Plan (Documents Instruction):								
a. Prepares Concept Card.	—	—	—	—	—	—	—	—
b. Prepares Detailed Outline of Lesson Manuscript.	—	—	—	—	—	—	—	—
c. Prepares Student Outline.	—	—	—	—	—	—	—	—
d. Prepares Student Study Materials	—	—	—	—	—	—	—	—
e. Other_____	—	—	—	—	—	—	—	—
8. Presents formal instruction:								
a. Conducts rehearsals.	—	—	—	—	—	—	—	—
b. Conducts lectures.	—	—	—	—	—	—	—	—
c. Conducts demonstrations.	—	—	—	—	—	—	—	—
d. Leads group discussions.	—	—	—	—	—	—	—	—
e. Prepares and administers self-paced instruction.	—	—	—	—	—	—	—	—
f. Supervises student application.	—	—	—	—	—	—	—	—
g. Conducts remedial instruction.	—	—	—	—	—	—	—	—
h. Other_____	—	—	—	—	—	—	—	—
9. Plans revision of instruction based on Post-Assessment and student feedback.	—	—	—	—	—	—	—	—
10. Responsible for Instructional Television production.	—	—	—	—	—	—	—	—
11. Counsels students on their performance - their progress and problem areas.	—	—	—	—	—	—	—	—

Part II

Evaluations of Formal Presentations

	Supervisory Level							
	1	2	3	4	5	6	7	N/A
1. Voice	—	—	—	—	—	—	—	—
2. Mannerisms	—	—	—	—	—	—	—	—
3. Presentation	—	—	—	—	—	—	—	—

Remarks:

INSTRUCTOR TRAINING IN THE ROYAL NAVY

Instructor Capt John Franklin
Deputy Director (Personnel) of the Naval Education Service
Royal Navy; London, England

INTRODUCTION

This brief paper covers the selection and training of uniformed instructors in the Royal Navy and gives details of the officer Instructor Branch. Because the symposium to which this paper is addressed is concerned with military instructors only, the civilian element, although forming a significant and important part of the total teaching force, will be referred to only in passing.

A. THE TRAINING TASK

As in all peace-time navies, the commitment to training in the Royal Navy is high. Over and above front-line operational training which of course dominates the scene for sea-going ships and aircraft, almost 25% of the Royal Navy is engaged in training of one sort or another. In spite of this heavy loading, close control of training programmes has held cost in check and, leaving aside flying training and capital depreciation, generally the annual budget for training is less than 10% of the expenditure on the Navy as a whole. Around 55% of trainees are in initial training and 45% in higher training; some 500 courses are provided in about 20 shore establishments. Annex A shows these figures in more detail.

Of the 2200 teaching staff in shore establishments and at sea, some 1800 are officers and ratings who have been selected to fill nominated instructional billets and the remaining 400 are Instructor Officers. In addition, some 350 civilian instructors ranging from demonstrators to college professors are employed in naval training establishments. The spectrum of instruction given is extremely wide, ranging from simple practical drills on the one hand to degree and post-graduate lectures on the other.

The title Naval Instructor, then, covers a wide range of abilities and aptitudes and he needs to be trained in many different specialisations. These aspects of his training will not be described; they are diverse both in type and in character. Common to all however, is the professionalism of the instructor as a teacher and it is this aspect that is of concern here. The underlying discipline in all naval instruction is the application of objective training principles.

Objective Training Principles

The use of Objective Training principles in the Royal Navy has led to a much tighter control of training and has produced courses free of many of

the inessentials and irrelevancies that often bedevilled instruction in the past. Over the last four to five years since objective training first made its impact in the Royal Navy, training costs have reduced in real money terms. During this time course loadings, in terms of number of student weeks, after rising to a peak in 1972/73, are now back at around the same as in 1970/71.

A further development has been the increased emphasis given to training design at establishment level. A distinction between the two constituents of instruction viz training design and training execution is now recognized in the organisational structure of many naval training establishments. Yet these changes have not been without their detractors. Some feel that training design and execution are inseparable and that it is illogical to make what they see to be an arbitrary distinction between the two. Some go further and question the whole basis of training expressed solely in behavioural terms. These criticisms have to be answered before the role of the instructor can be clearly defined.

Education and Training

An instructor is part educator and part trainer. Objective Training principles can be more easily applied to the latter than to the former and there is considerable danger that the educational content of training courses may suffer as a result. It is not easy to make a clear distinction between education and training but training may be thought of as a means of imparting knowledge and education as a means of dispelling ignorance. Thus in the naval context, training would be the acquisition of career skills by systematic instruction and practical experience under supervision. Education on the other hand would be that which encourages and provides, in support of training, an understanding of the underlying principles. Education is concerned with the general all round development of the man - his habits, mental abilities and attitudes, summarised as the "whole-man."

In the Royal Navy the "whole-man" concept has been accepted as the proper basis for training and virtually all courses are required to have an educational element. The amount of time allowed for this is at minimum, 5-10% of the course; in some courses such as those for apprentices it might be over 60% whilst, in some officer's courses it would cover almost the whole.

It is important therefore that all instructors are fully versed in objective training principles, both in their use and in their limitations. Lack of time and money prevent Royal Navy instructors being given the long period of training that many feel desirable. Nevertheless, all instructors attend at the Royal Naval School of Educational and Training Technology (RNSETT) before taking up a teaching appointment and here they receive a good introduction to the application of objective principles. The training given at this school will be discussed in more detail

in a later section.

B. THE INSTRUCTOR BRANCH

The Instructor Branch is composed of officers recruited primarily for duties in Education and Training. It is the only such group. The main divisions of the Royal Navy are the Seaman and Airman, Engineering, and Supply and Secretariat. At office level these three combine to form the General List, all of whom are on full career commissions. In addition, there are Supplementary Lists of Officers on Short Service Commissions in each of the three divisions and Special Duties Lists composed of ex-ratings. Outside the General List there are the Specialist Branches which include Medical and Dental and Instructor Officers. The Instructor Branch comprises some 630 officers and is led by an Instructor Rear Admiral who is also Head of the Naval Education Service. In addition to Education, his responsibilities include Resettlement, Language Training and Libraries and he assists the Director General Naval Manpower and Training (DGNMT) in certain aspects of training. There is no rating substructure but a few naval airmen undertake duties in Meteorology and Oceanography which is one of the responsibilities of the branch; also in all ships and most shore establishments, RN or WRNS ratings act as Education Assistants. Instructor Branches are to be found in a number of navies outside Great Britain, notably those of Australia, Canada and New Zealand.

Role of the Branch

Educators of some form or another have served with the Fleet since the early 17th century and the title Naval Instructor dates back to 1842. The present structure derives from 1962 when the need for a separate branch devoted in the main to a training role was endorsed but at the same time wider employment of Instructor Officers outside conventional instructional tasks was given fresh encouragement and impetus. This broadening of employment has continued over the last twelve years and the Branch is now engaged in a wide range of tasks. The provision of services in Meteorology and Oceanography for the navy is a traditional role for the Branch and the Director of Naval Oceanography and Meteorology (DNOM) is an Instructor Captain. A more recent area of development is that of Automatic Data Processing (ADP) where Instructor Officers have played a leading part in naval activities. In a more general role, the Instructor Officer acts as scientific adviser to the Captain. A fuller description of the tasks currently carried out by the Branch is given in Annex B.

Structure

The Branch is made up of three lists: a full career list, a 16 year list and a 5 year short-service list. (The numbers presently serving in

each of these lists are given in Annex B.) Entry to the Branch is exclusively through the short service list and transfer to either the full career list or the 16-year list is made after a minimum period of two years.

The Instructor Officer joins as either a Lieutenant or a Sub-Lieutenant depending on the amount of seniority he has been awarded for his qualifications and pre-service experience. Promotion to Lieutenant Commander is automatic for all Instructor Officers on their attaining eight years seniority as a Lieutenant. Thereafter, promotion to Instructor Commander and Instructor Captain is by selection from within zones of seniority of four to ten years as a Lieutenant Commander and eight to twelve years as a Commander. Retirement ages are 48, 52 and 55 respectively for Lieutenant Commanders, Commanders and Captains.

One of the big advantages of the Instructor Branch over other branches is its flexibility of rapid expansion or contraction through control of short service recruiting. There has been the normal cycle of fluctuation in the number of suitable applicants (which reached a peak in 1972/73 of 1500 enquires for 60 places) but it is unusual if officers cannot be recruited to match requirements. The diagram in Annex B illustrates the recruitment and wastage pattern, with a typical set of numbers envisaged for the future. The career factors needed to reach the steady state shown in the diagram are 65% from Lieutenant Commander to Commander and 39% from Commander to Captain. Although these are not being attained at the moment because of the large batches of junior officers presently passing through the zone, things are moving in this direction and should be steadying off at these figures in a few years time.

Potential recruits are attracted to the Instructor Branch from a varied set of occupations. The main demand is for science and technology graduates but there are openings for a limited number of other graduates and teachers. Although non-graduates are accepted on to the short service and 16-year lists, the full career list is restricted to officers of graduate status. The current breakdown of numbers by qualifications is given in Annex B.

Sea Time

Since the war, opportunities for sea time for all technical officers have steadily decreased for many reasons; notably as the need for a highly trained shore support has grown. In the Royal Navy there are now almost four officers ashore for every one afloat. The shortage of sea billets affects every branch but particularly Instructor Officers because of their primary role of training on shore. Meteorology and Oceanography jobs afloat provide a large share of sea appointments; otherwise it is generally only the larger ships that can boast of their own Instructor Officer. Provision is made however for Instructor Officers to be available for Met

and Education duties in small ships when required and the Commanding Officers have made good use of this facility. In all, some 10% of the Branch are at sea at any one time. For the future, it is expected that the present level of 2-1/2 years seatime will be maintained for all full career officers up to the rank of Commander, but opportunities for short service officers and those on the 16-year list may possibly suffer. At Commander's rank itself, there are presently only three jobs afloat (HMS ARK ROYAL, HERMES & BULWARK); at Captain's rank there is none.

The Way Ahead

An examination of the role of the Instructor Branch has recently been conducted as part of a larger study to look into the structure of the officer corps as a whole. The results of this study have not yet been released and the report has been held up awaiting the results of the UK Defence Review. However, there is no doubt that the need for a uniformed professional branch dedicated in the main to training and education will remain, assuming wider responsibilities as the Service requires. The Instructor Officer is very much a Naval Officer in the fullest sense of the word and takes a combatant role within the ship's organizations as the occasion demands. The broadening of the role of the Instructor Officer has been realized not only in the wider range of tasks he has undertaken but also in the increasing participation he has made in naval administrative duties, particularly in the training establishments. All this has led some to the view that it is no longer logical for the Instructor Branch to remain outside the General List. It remains to be seen if the protagonists of this point of view will prevail over those who see the Branch retaining its traditional specialist role.

C. THE SELECTION AND TRAINING OF INSTRUCTORS

It was said earlier that Instructor Officers were the only group specifically designated for the instructional role. This would not have been true a month ago. Until the beginning of this year when the Seaman and Communication branches of the Royal Navy were amalgamated to form the Operations Branch, the title Instructor was a recognized rating qualification in a number of specializations including Gunnery, Torpedo and Anti-Submarine, Radar and Communications. In all there were about 1000 ratings in this category. Since 1st January, the title of rating instructor has lapsed and seamen are no longer selected exclusively for instructional duties. This has brought them into line with the technical branches and has avoided the disadvantage of the previous system whereby specialist qualifications were not tied to substantive rating (e.g., Leading Seaman or Petty Officers). From now on all instructors other than Instructor Officers - some 350 officers and 1400 senior rates - will be appointed or drafted to instructional posts as part of a wider career pattern.

Selection

Officers and ratings are selected as instructors on the basis of reports made on them which comment on their suitability for instructional duties. In the case of officers, this report (S206) is made yearly for most officers and half-yearly on those who are in the zone for promotion. For ratings, all Chief Petty Officers, Petty Officers and Leading Rates are assessed as suitable or not for instructional duties on their Advancement and Conduct sheets (S239), on Divisional Officers' Record Sheets (S264) and on their Drafting Preference Cards. No formal screening process is employed and the man's particular rate, his professional knowledge and his preference for a particular geographical area are important considerations which help to determine selection for an instructional job. Retention of highly skilled senior rates in an all-volunteer navy is a perennial problem and while shortages exist, it is not always possible to give the priority one would wish to matching a man's instructional ability with the level of teaching expertise required in a given job.

Training

The focal point for the training of RN instructors in specialist instructional matters is the Royal Naval School of Educational and Training Technology at Portsmouth. This school was formed in 1971 by the amalgamation of the Navy's Instructional Techniques School and the RN Programmed Instruction Unit. The former is of long-standing but the latter is more recent and owes its origin to the early application of Educational Technology principles to service teaching that stemmed partly from the UK and partly from the USA and Canada. Although these two units originated independently, they both have a common underlying discipline and under the pressures of objective training, it was a natural conjunction to house them together in a new school. The RNSETT is divided into two main groups; Methods and Management; the Officer-in-Charge of the School is an Instructor Commander and Instructor Lieutenant Commanders head each of the two groups. Altogether the staff comprises 15 officers; 9 in the Methods group and 5 in the Management. In addition there are 12 ratings. The School is charged with "promoting the application of the most cost effective techniques in management and methods of training and education" (see Annex C) and has been most active in the expanding field of educational and training technology, acquiring in the three and a half years of its existence a standing of international repute. The courses at RNSETT (detailed in Annex C) cover a number of different aspects of training methods and management.

The heaviest recurrent load on the School comes from the courses in Instructional Technique which are given at two centres, one in Portsmouth and the other in Devonport. All officers and ratings selected for instructional posts are required to undertake the Instructional Techniques course and with an attendance of 30 per course at Portsmouth and 12 at Devonport, the school caters on this course for an annual throughput of

over 1000. The course lasts for one week and trainees are taught to prepare lesson plans and progress tests and to instruct, using the lesson method. A practical examination is held at the end of the course and the failure rate is less than 1%. Periodic surveys of training establishments are made which provide a follow-up of instructors' performance and a feedback to the School.

In addition to the formal courses, the RNSETT offers "Packaged" courses comprising self-instructional tapes, scripts and visual aids for use by establishment staff. These are presently available for an Objective Training Acquaint and for Programmed Learning Supervisors. Also there is a Presentation Techniques Acquaint Course during which officers who are required to give presentations are advised by the RNSETT staff on the suitability of their prepared script and are able to practise their delivery using video-tapes and other aids. Some 400 students per year use these "packaged" facilities.

Whilst RNSETT provides the educational and training technology courses for the naval instructor, associated specialist courses are given at other establishments. For example, professional courses for all Petty Officers include an element which prepares them "to supervise, organize and carry out on-the-job training at sea"; and at the RN Submarine School, a one-week induction course is given to all those going into submarine training, as a follow up of the RNSETT Course. The latter, which includes lectures on learning psychology, has been modelled on similar courses given at the USN Submarine School in New London. Officers' career courses include leadership training which overlaps with instructor training; and leadership courses for ratings are provided at the RN Petty Officers' School and for leading rates at five other naval establishments. For Instructor Officers, training in Educational Technology forms part of their career courses and these will now be described in more detail.

The Training of Instructor Officers

The training programme for Instructor Officer falls into three parts: initial training, training following transfer to longer-term commissions, and higher training. These will be dealt with in turn as follows.

The initial training of Instructor Officers follows a common pattern irrespective of pre-service qualifications. Thus no account is taken of previous teacher training (though about one-third of new entrants are qualified in this way) or indeed of any experience as teachers or lecturers. All new entrants join the Britannia Royal Naval College, Dartmouth where in common with new entry officers of other branches, they undertake a one term course in the basic tenets of the naval profession. Included in the course is a period of three weeks at sea either in the Dartmouth Training Ship (one of the Royal Navy's two Amphibious Warfare ships) or in the Hong Kong Squadron. From Dartmouth they go on to the RNSETT for the career course in Instructional Technology which comprises two weeks study in instructional techniques at the school followed by eight weeks training practice under RNSETT

supervision at a training establishment; they finally return to the school for a further two weeks of consolidation. The embryo Instructor Officer is then ready for his first complement job which, as far as is possible, is arranged to be at a different establishment from the one at which he was a student.

Following transfer to a longer-term commission, the Instructor Officer undertakes the Instructor Officer's Long Course. This is a very flexible course which caters for the wide range of activities on which the newly-transferred Instructor Officer may have to embark. It is held once a year and is composed of a number of career modules together with objective courses designed to lead to specific skills and attainments such as for example, a qualification in Meteorology and Oceanography. The aim is to provide a basic background in those subjects with which every senior Instructor Officer should be acquainted, together with work in depth in one of a number of more narrow specialisations.

Finally, Instructor Officers participate in the full range of higher education and training courses provided for officers of all specialisations. These include staff courses, university post-graduate courses and specialist courses in subjects such as ADP, Management, etc. They are detailed in Annex D which provides a summary of Instructor Officers Training.

Recent Developments

The field of Educational and Training Technology is notorious for the pace of innovative change. There has been a proliferation of audio and visual aids, experiments in variable size teaching/learning groups, objective questioning techniques, continuous assessment and programmed learning to name but a few. An innovation of significance in the Royal Navy has been the introduction of free-running courses in Auxiliary Machinery (at HMS SULTAN) and in Basic Electricity (at HMS COLLINGWOOD). In the latter course, computer programming has been used to control the flow of ratings through the various parts of the programme. In each case, the rating maintains his own speed of progress. The conduct of these courses has been reported elsewhere (1). Some success has been achieved in this way but in some cases results have not come up to expectations for a number of reasons, mainly because of complications of programming. There is some doubt too whether student motivation can be sustained at the same level after the initial novelty of the trial has worn off. Experience at HMS COLLINGWOOD shows that the method is more suited to senior ratings who are already motivated than to juniors who find individual working difficult.

More recently a comprehensive job survey has been conducted of those occupying instructional posts. Analysis of the results of returns by Instructor Officers is still awaited but that for the remainder (some 200 officers and 850 ratings) is now finished and the results published (2). It is clear there is a need to emphasise more the training given to the instructor before he takes up his job. The report is presently being studied and when the Instructor Officers' Survey analysis is complete, any changes necessary will be put in hand.

This section on the selection and training of instructors points to the desirability of more positive identification of potential instructors in the Royal Navy and if the manning situation and financial position allow it, of a more comprehensive training programme. Discussions are currently proceeding on the use of computers to assist the selection process; and proposals to increase the length of certain of the RNSETT courses and to add further titles to the range of courses available are currently being considered. A Job Evaluation study into the employment of Short-Service Instructor Officers has been started and is expected to be finished later this year. It is hoped that the stringencies introduced by the United Kingdom Defence Review will not result in a cut-back in these plans.

SUMMARY

This very brief paper has covered, in outline, Royal Navy instructors and their training. The application of Objective Training principles has led to a clearer appreciation of what has to be taught and at the same time has highlighted the problems connected with the training given to instructors. There is a danger in making training too narrow by reducing the educational content too much and there is a paramount need to train minds to be flexible and adaptable. Objectivity must take account of the wider issues of learning and interest so that the trainee can cope with emergencies, however unexpected, that could be his ultimate challenge. Our prime concern must be for the man himself and unless we design courses to cater for his individual needs, in all their variety, we will have failed in our purpose.

(1)a. Naval Electrical Review, Volume 24, Number 4, April 1971, Lightbowns Ltd, IOW.b. Aspects of Educational Technology, Vol VII, 1973, Pitmans, London.

(2) RNSETT, Royal Naval Instructor Survey Report, HMS NELSON, September 1974.

ANNEX A

THE ROYAL NAVY : COMMITMENT TO TRAINING

Total Strength:			70,000
Trainees:	Initial training	5,000	
	Higher training	4,400	
Staff:	Administrative	5,100	
	Teaching	2,200	
Total Personnel in Training:			16,700

(There are in addition about 350 civilian teaching staff.)

Instructor: Trainee ratio ranges from 1:2.2 to 1:22.6 with an average around 1:4-1/2

Running Costs:

Training Execution:	45%
Identified Training Design:	3%
Training Support:	52%

ANNEX B

The Role of the RN Instructor Branch

1. The Director of the Naval Education Service is Head of the Naval Education Service and Head of the Instructor Branch of the Royal Navy. In addition to Education his responsibilities include Resettlement, Language Training and Libraries; and he assists the Director General Naval Manpower and Training (DGNMT) in certain aspects of Training. Appendices 1 to 3 show the breakdown of the Branch by numbers and qualifications.

Service Training

2. Training is the major role of the Instructor Branch. The majority of Instructor Officers are employed in this field, providing instruction in the educational, technical and operational components of Service Courses ranging from elementary work in New Entry establishments to degree and post-graduate studies at the RN Colleges.

3. The Instructor Branch has a special concern in negotiations to obtain recognition of Service Courses by civilian bodies.

4. Instructor Officers are responsible for standards of Instructional Technique, they advise on the selection and application of training aids, and are increasingly involved in the design and planning of training courses. The Royal Naval School of Educational and Training Technology at Portsmouth exists to promote and co-ordinate developments in these areas of Educational and Training Technology.

The Operational Role

5. Approximately 18% of Instructor Officers are employed in full-time appointments outside the training and education fields (see appendix 4). These include Meteorological and Oceanographic duties in ships of the Fleet or on RN and NATO Staffs, Automatic Data Processing application, Intelligence, Operations Research, and operational appointments at sea.

Further Education

6. Outside its major commitment to Training and Operations the Instructor Branch is responsible for running the Further Education scheme as follows:

a. Education for Advancement and Promotion

Candidates for the RN Education Tests which are mandatory

qualifications for advancement and promotion are either taught directly by Instructor Officers in bigger ships and shore establishments or catered for by correspondence courses devised, administered and tutored by Instructor Officers and a small civilian staff based in Portsmouth.

b. Education for Individual (Vocational) Needs

Personnel wishing to improve their general education can obtain financial assistance to undertake a wide variety of approved courses. These include correspondence courses in a comprehensive range of academic and vocational subjects; Local Education Authority and Colleges of Further Education classes, both evening and day-release; short residential courses at universities; and Open University enrolment. The scheme is administered by the Instructor Branch, the Ship/Establishment Education Officer being responsible for informing and advising personnel of the scope and nature of its provision, and processing applications.

c. Recreational Activities

(i) Reference and recreational libraries are maintained in all ships and establishments. The Director of the Naval Education Service is responsible for this provision, and Education Officers exercise "on the spot" charge.

(ii) The RN Drama Festival is organised by the Director of the Naval Education Service, local arrangements being the responsibility of Staff Instructor Officers.

d. Children's Education

Instructor Officers in ships and establishments are available to advise service parents on children's educational matters. Staff Instructor Officers liaise with Local Education Authorities. Instructor Officers serve with the Service Childrens Education Authority which looks after Service Schools at home and abroad. The present Controller is an Instructor Captain.

e. RN Resettlement Service

The Director of the Naval Education Service is responsible for the overall organisation of this service, which comprises information, advice, training, and liaison with job finding organisations such as the Department of Employment, the Officers Association, and the Regular Forces Employment Association. Primary contact with personnel is through Ships' Resettlement Information Officers (RIO),

and this duty is performed by Insructor Officers where borne. Any officer or man may seek advice at any time; but interviews with the RIO are obligatory for all eligible ratings at a point 2-1/2 years before release. The RIO arranges subsequent advice interviews with Service and civilian specialists and forwards application for advice courses as appropriate. He also processes applications for pre-release training courses which are normally taken during the last six months of service either at Service Resettlement Centres such as the RN Pre Release Voluntary Training (PRVT) centre at Portsmouth, or in civilian further education colleges, or with civilian firms.

Language Training

7. The Director of the Naval Education Service is responsible for the provision of foreign language training schemes to meet intelligence and operational requirements and to maintain the RN Interpreter Pool. Training takes place in service establishments and civilian institutions and by private tuition in UK and overseas. Foreign language learning is also encouraged as part of the general education provision.

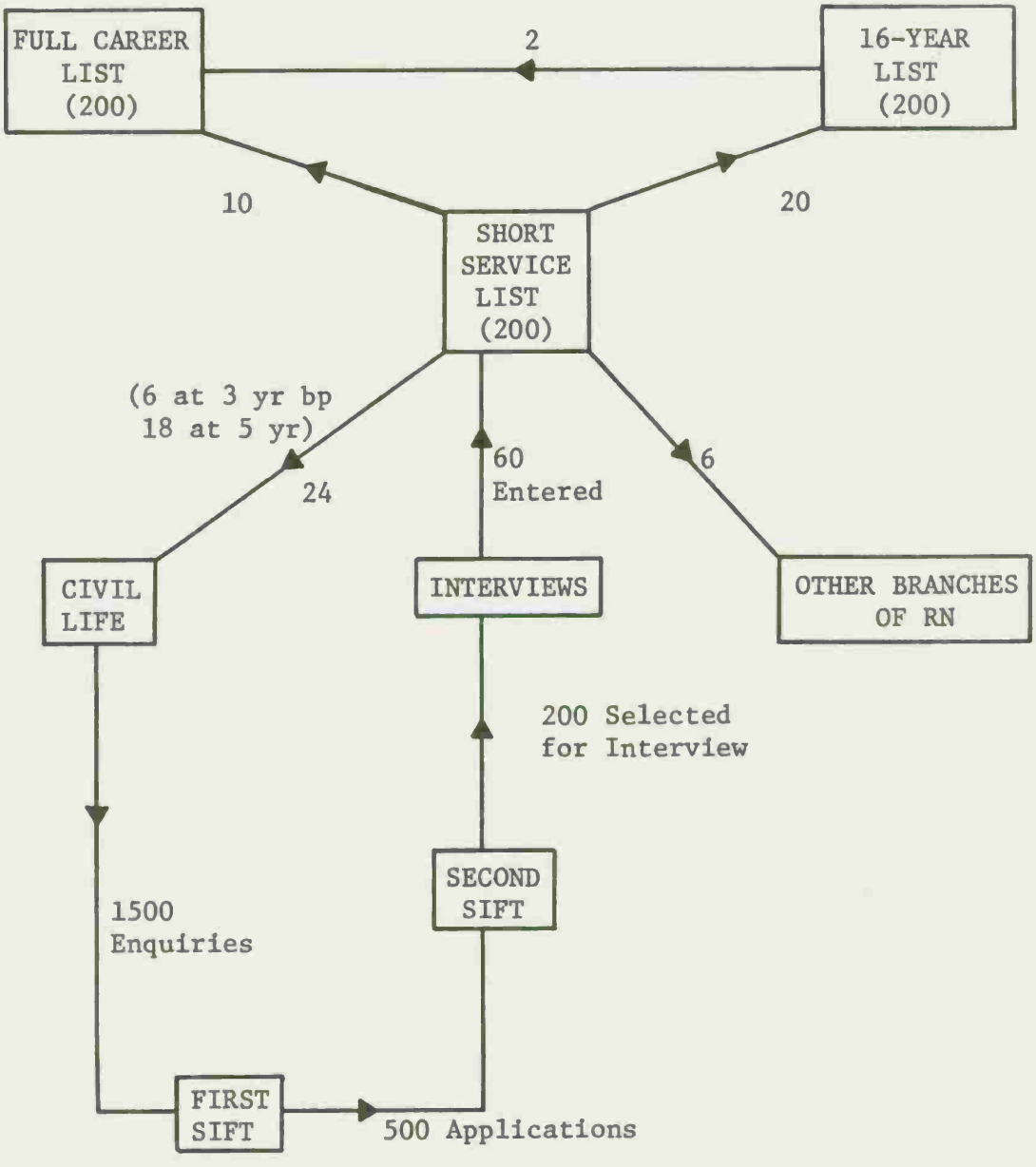
APPENDIX 1 TO ANNEX B

INSTRUCTOR BRANCH BEARING : JANUARY 1975

Rank	Full Career List	16 Year List	Short Service List	Total
Rear Admiral	1	-	-	1
Captain	17	-	-	17
Commander	65	-	-	65
Lieutenant Commander	164	91	20	275
Lieutenant	19	49	203	271
Total	266	140	223	629

APPENDIX 2 TO ANNEX B

FUTURE STEADY-STATE PATTERN OF RECRUITMENT



APPENDIX 3 TO ANNEX B

INSTRUCTOR BRANCH : QUALIFICATIONS

A. Academic

Graduates:	
Doctorate	6%
Master's Degree	16%
Bachelor's Degree	58%
Non-Graduates:	
Teacher's Certificate	9%
Diploma	11%
Total	100%

B. Subject Discipline

Graduates:	
Mechanical Engineering	14%
Electrical Engineering	12%
Science	33%
Mathematics	10%
Arts	11%
Non-Graduates:	20%
Total	100%

APPENDIX 4 TO ANNEX B

EMPLOYMENT OF INSTRUCTOR OFFICERS

Task Area	Proportion of Branch Employed *
Officers Training	18%
Ratings Training	43%
Meteorology and Oceanography	12%
Educational and Training Technology	8%
Education and Resettlement	7%
Automatic Data Processing	3%
Service Children's Schools	1%
Management Studies	1%
General List and Royal Marines Duties	1%
Scientific Research	1%
Administration	5%
Total	100%

* Officers under taining, on courses, etc. are not included.

ANNEX C

RN SCHOOL OF EDUCATIONAL AND TRAINING TECHNOLOGY

1. Introduction. The Officer-in-Charge, RN School of Educational and Training Technology is charged with promoting the application of the most cost effective techniques in management and methods of training and education.

2. Primary Purposes. The primary purposes are to:

   a. train RN, RM and WRNS personnel in the management and methods of training and education.

   b. advise MOD (Navy) and subordinate authorities.

3. Secondary Purposes. The secondary purposes are to:

   a. provide assistance to MOD (Navy) and subordinate authorities who do not have the appropriate resources.

   b. represent MOD (Navy) on the Joint Services Committee for Educational Technology.

   c. train RN, RM and WRNS Reserve Personnel.

   d. enhance the public image of the RN in the field of educational and training technology.

4. Courses. The courses currently provided at the RNSETT are:

   A. Career

	Length	Frequency pa	Course Attendance
1. Instructor Officers' New Entry Course	12 weeks	3	20
2. Instructor Officers' Long Course	2 weeks	1	30
3. WRNS Instructional Assistant	3 weeks	5	12

B. PJT

		Length	Frequency pa	Course Attendance
1.	Objective Training Management	3 days	5	10
2.	Objective Course Management	1 week	10	12
3.	Training Analyst	1 week	10	12
4.	Course Design	3 days	6	10
5.	Training Assessment	1 week	6	10
6.	Instructional Technique			
	Portsmouth	½ week	32	30
	Plymouth	1 week	30	12
7.	Closed Circuit Televison Production Technique	1 week	5	12
8.	Programme Learning Writers	2 weeks	2	10
9.	Objective Training Acquaint	½ day	-	300 pa
10.	Programmed Learning Supervisors	1½ days	-	50 pa
11.	Presentation Techniques Acquaint	½ day	-	75 pa

ANNEX D

INSTRUCTOR OFFICERS TRAINING

1. New Entry Training

A. BRNC Course — 1 Term

Includes 3 weeks seatime.

Aims: a. To develop the conduct and sense of duty required of officers;

b. To give New Entry Instructor Officers a broad view of their profession;

c. To prepare them for the next stage of their training and to enable them to carry out the task of Assistant Officer of the Day and Assistant Divisional Officer.

B. RNSETT Course — 12 weeks

Comprising: 2 weeks at RNSETT;

8 weeks teaching practice in a Naval training establishment;

2 weeks at RNSETT.

Aims: a. To discuss the problems of teaching and learning in the Naval environment;

b. To identify the tasks of the Instructor Officer and discuss the professional skills and techniques required during a short service commission;

c. To practice a selection of teaching methods and use of audio and visual aids;

d. To discuss Objective Training principles applied to training;

e. To practice teaching skills in a Naval training environment;

f. To prepare, conduct and assess tests and examinations.

2. Instructor Officers Long Course

Undertaken on transfer to a full career or 16-year commission.

The course is composed of:

A. Career Modules

Warfare Acquaint	1 week
Staff Work	1 week
Education/Resettlement	2 weeks
Educational and Training Technology	2 weeks

B. PJT Modules

One or more of the following:

Meteorology and Oceanography: Full Course	24 weeks
Short Course	8 weeks
Navigation:	8 weeks
NBCD:	2 weeks
Flight Deck Officer:	2 weeks
Air Acquaint:	2 weeks
Submarine Acquaint:	2 weeks
RM Commando Course:	6 weeks
Photographic Interpretation:	10 weeks
Interrogation:	1 week
Funding:	1 week

3. Higher Education and Training

Undertaken as part of the normal pattern of courses for officers of all Branches:

A. Staff Colleges

1. Lieutenants Course, Greenwich	1 term
2. RN Staff Course, Greenwich	6 months
3. National Defence College, Latimer	11 months
4. NATO Defence College, Rome	6 months
5. Senior Officers War Course, Greenwich	6 months
6. Royal College of Defence Studies, London	1 year

B. PJT Courses

1. Specialist Courses (eg ADP)	up to 1 year
2. University PG Courses	1 year
3. Language Training	3 months

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THE INSTRUCTOR TRAINING PROGRAM
at Service School Command
Naval Training Center
San Diego, California[1]

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The purpose of this paper is to summarize the instructor training program at Service School Command, Naval Training Center, San Diego, California with emphasis on the Instructor Basic (A-012-0011) course.

January 1975 marks the beginning of the twenty-sixth year of instructor training at San Diego, California. Over the years, the Instructor Basic course has earned a reputation of excellence within the Naval Establishment as well as within the community of professional educators and industrial training personnel. It is a matter of common report that the course has always stressed "fundamentals" of good teaching practice, presented by a staff of highly motivated petty officers who set the example of thorough preparation, enthusiasm for teaching and genuine interest in the progress and growth of their students.

The Instructor Basic (A-012-0011) course is one of eleven courses implemented by the Personnel Management Schools department. The course is three and one-half weeks in length and convenes fifty times per year.

Students attending the course include Navy enlisted and officer personnel ranging from pay grade E-4 through O-6, Marine Corps enlisted and officer personnel, officers and men of our Allied Nations, and occasional civilian personnel employed by federal agencies and/or defense contractors.

Quotas for the course are controlled by the Chief of Naval Personnel. Prospective U.S. Navy instructors attending the course are in transition from sea duty assignments to shore-based instructor assignments designated as Code "I" billets. Approximately fifty percent of those ordered to Code "I" billets are volunteers. In FY 74, 1497 prospective instructors successfully completed the course. Upon graduation from the Instructor Basic (A-012-0011) course, a prospective instructor serves a twelve-month probationary period under the supervision of qualified master instructors. Successful performance results in a recommendation for a secondary job code (9502) Navy Instructor.

[1]This paper was prepared by the Navy's Instructor Basic Course Curriculum Model Manager for inclusion in the proceedings but was not presented at the conference.

The staffing for the Instructor Basic (A-012-0011) course is critical to the success of the course. Staff members must be intrinsically motivated to serve as "teachers of future teachers," willing to sacrifice a tour of duty out of their specialized fields, and in some cases, give up "proficiency pay." Additionally, they must accept the responsibility of continuing study in the rapidly expanding field of educational technology. Staff members are, in part, selected from a pool of prospective instructors attending the course and enroute to Code "I" billets within Service School Command, Naval Training Center, San Diego. This policy has been established by the Commanding Officer of Service School Command. Some staff members are ordered directly from the office of the Chief of Naval Personnel.

Staffing completely with selected Navy petty officers has proven to be highly successful from several points of view for the Navy: (1) prospective Navy instructors "identify" readily with their peers who, also, have "Fleet" experience, (2) the concept that their peers serving and succeeding as model instructors suggests that they, too, can succeed as instructors, and (3) upon completion of a Code "I" tour of duty as a Navy instructor, a wealth of expertise in training and educational technology is returned to the Fleet in support of shipboard training by the qualified (9502) Navy instructor.

Fifteen instructors are responsible for implementing the Instructor Basic (A-012-0011) course. The instructors are organized into five teams of three. Each Monday, fifty times per year, a team will pick up a class and accept the responsibility for facilitating the learning of all subject matter in the curriculum. The "team leader" is responsible for the training of his team members. He may be junior in military rank, but "qualified" academically in the subject matter of the course. His task is to train and qualify his team members in all aspects of the curriculum. This plan of staff organization has been in effect since 1956, and has proven to be most effective. The junior member of each team eventually qualifies in all subject matter areas of the course and emerges to the position of "team leader." In terms of rapport with prospective instructors, a very strong relationship develops among instructors and students. A team spirit is unquestionably developed.

The subject matter of the Instructor Basic (A-012-0011) course in its present form is a product of a Navy-wide modified instructor training task analysis conducted in April of 1972 by direction of the Chief of Naval Technical Training. Four thousand four hundred and forty-seven Navy and Marine Corps instructors were sampled in seventy-one schools of nine major training localities. On 29 August 1972 the Instructor Training Schools of the Naval Technical Training Command were directed to prepare and submit a Training Task Analysis and a Strawman outline for instructor training based on the Modified Task Analysis data. The

outlines were subsequently discussed at an Instructor Training working conference, attended by representatives of all CNTECHTRA instructor training schools, in December 1972, at Memphis. On 14 December 1972, the Instructor Training School of Service School Command, Naval Training Center, San Diego was designated as the Curriculum Model Manager, charged with the responsibility of preparing and maintaining the curriculum for training Navy instructors. The curriculum was prepared and subsequently approved for implementation by CNTECHTRA ltr. code 443 Ser 44/297 of 19 April 1974.

The Instructor Basic (A-012-0011) course is based upon the systems approach to course design. It provides for the training of prospective instructors for assignment to conventional group-paced environments as well as those preparing to function as learning supervisors in an individualized, self-paced, multi-media learning environment. Students preparing for qualification as Code "I' billet instructors may be accelerated based upon proven experience as Navy instructors, formal academic preparation, and demonstrated performance of achievement of the criterion tests established for the course. Successful completion of the Instructor Basic (A-012-0011) course is based upon the criterion testing concept of demonstrated performance of the skills required on the job.

Staff instructors are evaluated quarterly on a formal basis in accordance with CNTECHTRA INST 1540.12. Informally, instructors are evaluated daily by students, fellow staff members, and Education Specialists.

Feedback is achieved in a variety of ways. Representative of these are:

1. daily student commentary
2. cumulative student critiques
3. end-of-course critiques
4. instructor evaluations
5. meetings of team leaders, Education Specialists, and division directors
6. informal visits of graduates
7. informal visits of staff instructors to Naval schools
8. formal CNTECHTRA survey (CNTECHTRA GEN 1500/8)

In order to maintain a high quality of performance in instructor training at Service School Command, Naval Training Center, San Diego, a vigorous program of inservice training is fostered. A representative sampling of inservice training activities include:

1. assigned readings of professional literature
2. a continuous instructor evaluation program
3. consultations with resident Education Specialists
4. demonstration lessons by selected staff members
5. training sessions conducted by resident Education Specialists
6. cross-training in Programmed Instruction Techniques Writers course
7. cross-training as a learning supervisor
8. team leaders attend the Naval Schools Management course
9. all staff members visit Naval schools within the immediate community to study the "world of reality"
10. participation in programs of academic improvement such as San Diego Evening College and Navy Campus for Achievement

On February 15, 1972, the CHNAVTECHTRA expressed a concern that the basic Human Value Goal system articulated by Professor Harold Lasswell of Yale University be incorporated in the training system of Navy instructors. The enhancement of human values is a continuing concern of the staff of Instructor Training at Service School Command, Naval Training Center, San Diego, California.

AN OVERVIEW OF THE TRAINER DEVELOPMENT PROGRAM (TRADEP)

UNITED STATES ARMY INFANTRY SCHOOL

Colonel Billy E. Rutherford
Directorate of Educational Technology
Faculty Development Division
United States Army Infantry School
Fort Benning, Georgia

Prior to 1972, the Basic Instructor Training Course was four weeks in length and was presented in a traditional classroom manner with emphasis on Methods of Instruction. All officers and NCO's attended essentially the same course without regard to their experience, rank or departmental assignment.

During 1972, the United States Army Infantry School began an extensive evaluation of the course. As a result of this evaluation, it was determined that additional instruction was required on the theory of learning and lesson development. All instruction was converted to self-paced, mediated material such as TV, tape-slide programs and programmed texts. The number of practical exercises was reduced from nine to seven by eliminating a twenty minute exercise and briefing requirment. The revised self-paced course was an improvement, but still did not account for individual differences and potential job assignment.

Also during this period, the United States Army Infantry School was developing the Training Extension Course (TEC) series of lessons on Military Training with the support of the Combat Arms Training Board (CATB). Recognizing the potential value of the TRADEP project, CATB agreed to fund an additional research effort dealing with military instruction. The TEC contractor, INSGROUP, INC. (Instructional Systems Group) of Orange, California, immediately began the systems engineering process by identifying the functions of an instructor by rank and potential job. The nine major functions identified were the result of an extensive job analysis conducted in every academic department of the USAIS. The refinement of these functions led to the development of five separate instructional routes as shown in Figure 1. Each route also identified the percentage of time an individual assigned to the route could be expected to devote to a specific function. This was essential in identifying and developing instructional materials to be used in the course. The next step was the identification of job tasks and the selection of tasks for training. Approximately seventy tasks were identified that an instructor could be expected to perform. Further analysis revealed that the "average" student would be required to successfully execute 33 of the tasks. Explicit training objectives were then developed to support each task.

ROUTES, TRACKS OR EMPHASES

Code Name	Marshall	Bradley	MacArthur	York	Watson
Color Code	Blue	Green	Gold	Orange	Red
	DIRECTORS	SUPERVISORS & SENIOR INSTRUCTORS	OFFICER TRAINERS	NCO TRAINERS	ASST TRAINERS
FUNCTIONS	06	04-05	01-04	NCO	
1 Predict future training needs of Army	5				
2 Develop training doctrine	5				
3 Develop training programs	10	10			
4 Supervise & manage training	20	30			
5 Assess training needs	5	15	10	5	
6 Establish & approve training objectives	15	20	20	15	
7 Organize lessons, units, etc.	15	5	15	20	20
8 Conduct training	5	5	40	45	50
9 Evaluation & quality control	20	15	15	15	30
	100%	100%	100%	100%	100%

Figure 1. TRADEP Instructional Routes

A survey test (pretest) was prepared to provide each student an opportunity to prove he could meet the standards of certain training objectives prior to starting the course in order to eliminate unnecessary instruction. Posttests were also developed to verify that students had mastered the objectives. All materials were developed as self-paced, mediated lessons which would be taken in the Individual Learning Center.

Although "instructor presentation technique" maintained its previous prominence in the course, an innovative approach was taken through the development of Trainer Appraisal Kits (TAK's). These kits contain the following material: a measurable objective, sample test items, sufficient background material to prepare for the class, and a description of the students to which the lesson will be taught. A TRADEP student would be given the TAK and required to teach a short lesson designed to cause other students, participating in the lesson as learners, to meet the standard of the TAK training objective.

Prior to the student's presentation of the TAK, a pretest is administered to screen out those individuals who can already perform the training objective to standard, as well as identify those students who do not meet the entry level requirements for the TAK. After the presentation, a posttest is administered to determine if the instructor caused the students to learn the subject. Primarily non-military subjects were selected for TAK's to insure that the students (learners) would have a limited knowledge of the subject.

Each student must successfully complete three TAK's and a 50-minute presentation of a problem selected by his department. Upon completion of these requirements, the student is qualified as an instructor at the USAIS. The course is normally completed in three to five weeks.

Throughout the course, students are organized into teams consisting of one other student, a qualified instructor acting as a sponsor, and a TRADEP instructor. Sponsors have specific duties and are an essential feature of the learning team (Figure 2).

The advantages of the TRADEP are: Provisions for differences in the level of a student's job responsibility by providing five separate, self-paced routes of instruction; individualization and personalization based on the student's background, experience, and job assignment; exportability, in that it will be available for use in National Guard and Reserve organizations; causing learning in students using proper instructor presentation skills is emphasized.

The goal of the TRADEP is to insure that the instructors at the USAIS cause 100% of their students to accomplish 100% of their critical training objectives. This program is designed to be one of the most challenging experiences a student has ever undertaken.

UNITED STATES ARMY INFANTRY SCHOOL
Directorate of Educational Technology
Faculty Development Division
Fort Benning, Georgia 31905

ATSH-DET-FDD

SUBJECT: Sponsor Duties (Trainer Development Program)

Sponsors of TRADEP Students
United States Army Infantry School
Fort Benning, Georgia 31905

1. Successful completion of the Trainer Development Program (TRADEP) requires the efforts of not only the student but also his sponsor.

2. As a sponsor you are responsible to:

a. Personally keep the Committee Chief informed of your student(s) progress and problems during TRADEP.

b. Be an integral member of the Learning Team.

c. Attend all Learning Team meetings.

d. Participate in Learning Team decisions.

e. Be prepared to attend at least two presentations by your student(s).

f. Adjust the relative progress of your student(s) to keep them equal or nearly equal throughout the course.

g. Participate in student rehearsals as required.

h. Be prepared to discuss your student's job and duty position with the Learning Team.

3. You are also responsible to resolve scheduling problems between the committee, yourself, and the student(s) to allow minimum disruption of the Trainer Development Program.

Figure 2. Sponsor Duties (TRADEP)

ATSH-DET-FDD
SUBJECT: Sponsor Duties (Trainer Development Program)

4. Consult with your student on a daily basis. Discuss the objectives completed that day (critique sheets and video-tapes when appropriate) and the requirements for the next day. Should questions arise or should a student have a special problem, contact the Team Monitor and discuss it with him as soon as possible.

5. By being designated a sponsor you have already demonstrated your own proficiency as an instructor. Your experience, suggestions, and encouragement to the student(s) you are sponsoring often make the difference between passing or failing this course. Your efforts are an essential part of the overall Trainer Development Program at the United States Army Infantry School.

BILLY E. RUTHERFORD
Colonel, Infantry
Director of Educational Technology

Figure 2. Sponsor Duties (Continued)

The Bradley, MacArthur, and York Routes are now operational. Since 1 April 1974, 204 students have entered TRADEP and 192 have successfully graduated. The breakout by individual routes is as follows:

	Failed to Meet Standards	Withdrawn	Graduated
Bradley Route	0	1	5
MacArthur Route	1	0	97
York Route	9	1	90
TOTAL	10	2	192

In completing the TRADEP, the officer student completes an average of 21 instructional modules in an average of 20 training days, while the noncommissioned officer student completes an average of 18 instructional modules in an average of 22 training days.

An interim evaluation, conducted for the MacArthur and York routes, indicated that TRADEP is far superior to previous instructor training courses given at the USAIS. A final TRADEP evaluation is presently scheduled for February 1975.

CURRENT AND FUTURE

U. S. AIR FORCE

INSTRUCTOR TRAINING PROGRAMS

Dr. Larry Harding
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Colorado

The scope of this paper is limited to instructor training in technical schools. This training is conducted by the Air Training Command (ATC) and is provided by the Air Force's Technical Training Centers located at:

Chanute AFB, Illinois
Keesler AFB, Mississippi
Lackland AFB, Texas
Lowry AFB, Colorado
Sheppard AFB, Texas

Instructor training is provided for Air Force personnel; and, in those instances where Inter-Service schools exist at these Centers, Army, Navy, and Marine instructors are also trained.

The size of the instructor force in ATC varies due to requirements, but the approximate instructor manning figures are: Enlisted, 4698; Officer, 501; and Civilian, 1339. ATC trains approximately 2200 technical instructors and 220 technical writers per year; and, through the in-service training program, approximately 6700 courses are completed per year.

Air Force personnel assigned to instructor duty are subject-matter experts who are qualified technicians. They must have the appropriate Air Force Specialty Code (AFSC) for the course which they are assigned to teach. Approximately 80 per cent of the instructors volunteer for instructor duty, spend a normal tour of three years in their instructor assignment, and then return to the field to work in their specialty. This affords the Air Force training with up-to-date field experience and helps ensure that the training provided meets operational requirements.

The general types of instructor training provided by ATC are Formal Pre-Service, Formal In-Service, On-the-Job Training (OJT) Advisory Service and Course Specific OJT.

Formal Pre-Service

The Formal Pre-Service courses include:

3AIR75100-X	Technical Instructor
3AIR99128	Military Training Instructor (BMTS)
3AIR75102-X	Technical Instructor (Condensed Version)

The Technical Instructor course must be taken before the subject matter expert can become an instructor. This course is six weeks, three days in length. A synopsis of this course as well as the others referred to in this paper is in Appendix A.

The Military Training Instructor course is given at Lackland only and prepares instructor personnel who are assigned to the Basic Military Training School at Lackland.

The Condensed Version of the Technical Instructor course is usually conducted by a mobile training team on request by the operational commands such as the Strategic Air Command, Air Defense Command, and Tactical Air Command. This course is two weeks in length. An accelerated version of the Technical Instructor course is also given to those personnel who have served as instructors in the past. This course is sometimes referred to as the "refresher course."

Formal In-Service

Air Training Command has a unique in-service training program. All instructors are required to take 36 hours of in-service training every year they are assigned to instructor duty. To encourage additional in-service and other professional training, the Air Force has the Master Instructor Program which is designed to motivate the instructor by providing him with recognition as a master instructor. The details of the program are provided in Appendix B. A list of the in-service courses available through the Instructor Training Division and the Center responsible for developing and maintaining the respective courses is included in Appendix C. The in-service training program ensures that instructors are continually improving their instructional skills.

OJT Advisory Service

There are two courses offered for the OJT trainer/supervisor--the 4AJF7500-15 course which is provided for the Air Reserve forces and the 4AJF7500-30 course which is provided for other operational commands.

OJT is one of the most important aspects of Air Force training, and all operational activities must provide a systematic OJT program to upgrade the skills of the technicians in the field. The job-related

knowledge is provided through Career Development Courses (CDC), and the hands-on training is provided on the job. The CDC's are written by qualified technicians who are co-located with the resident course that is designated the responsible agency (OPR-Office of Primary Responsibility).

Course Specific OJT

In addition to the formal required instructor courses, each technical course is responsible for establishing a course-specific training program for its instructors. These vary depending on the complexity of the technical material taught, whether the instructor is responsible for the whole course or only a particular segment, and sophistication of the instructional method being employed. For example, in the Electronics Principles Course at Lowry, the instructor is responsible for the entire course which is approximately 14 weeks in length. This requires a much more extensive training program in the technical aspects of the course than if he were responsible for only two to four weeks of the course. The courses where individualized instruction, multi-media, or computer-based instruction have been implemented require that instructors be trained in the specific administration of these systems.

Keesler AFB has developed the individualized, Standardized Electronics Principles Course and has established a faculty development center within the course to develop the instructor skills needed to support the individualized system. Other efforts which have required special training are the Plato Service Test which is being conducted at Sheppard and Chanute, the Advanced Instructional System being developed at Lowry, the Computer-Directed Training System which utilizes base-level computer support systems to train computer personnel in the operation and progamming of the computer system, and numerous instructional system design efforts which involve self-pacing and individualization of instruction.

Education and Training Career Fields

The Air Force, recognizing the need for providing specialized personnel, has career fields to support education and training for both enlisted men and officers. The Airman Education and Training Career Field (75) provides for sub-specialties in education, training and instructional system development. A description of this Career Field is included in Appendix D.

The Training Technician is particularly important in a discussion of instructor training in that he is assigned to the Instrucor Training Divisions at the respective Centers and is responsible for teaching the instructors.

The Education and Training Officer Specialty is important in instructor training since officers in this specialty are in charge of the

Instructor Training Divisions.

Instructor Training in Transition

Changes in the role and function of the instructor are emerging as a result of the implementation of individualized instruction and educational technology. Some of the new topics or those receiving additional emphasis are:

1. The Philosophy of Individualized Instruction
2. Individualized Learning Variables
3. Classroom Management in Individualized Instruction
4. Forecasting Student's Completion Date
5. Testing Procedures in Individualized Instruction
6. Media Management in Individualized Instruction
7. Student Location Control in Individualized Instruction
8. Student Counseling in Individualized Instruction
9. Remedial Instruction in Individualized Instruction
10. Peer Instruction in Individualized Instruction
11. Laboratories and Progress Checks
12. Managing Student Progress

It is interesing to note that these topics are not from textbooks being used in colleges and universities or even from formal ATC instructor training courses. These are topics being covered in the instructor training conducted by the Electronic Principles course at Keesler AFB and are necessary in the day-to-day conduct of operational training. The point being made is that these are areas of concern in the training of instructors at the present time--not the "blue sky" or those to be anticipated in the next 25 years. It is true that many of these areas are just surfacing, and there is a need to refine techniques and methodology through research and development and more formal instructor training programs.

The Technical Training Division of the Air Force Human Resources Laboratory (AFHRL) is presently engaged in developing the Air Force Advanced Instructional System (AIS) at Lowry AFB, Colorado. The AIS is a large-scale, computer-based, multi-media system for the administration and management of individualized technical training. The AIS is being developed jointly by AFHRL, Air Training Command, and McDonnell Douglas Corporation. The contract for the AIS was awarded in May 1973. For a general description of the AIS effort, see "The Evolution of the Air Force Advanced Instructional System" by Marty Rockway and Joseph Yasutake.

One of the primary concerns of the AIS is to provide adequate training for instructors and training managers so that it can be

successfully transitioned from a research and development system to an operational system. This is being accomplished in the following ways:

(1) The development is a joint effort and involves approximately 24 full-time ATC personnel who are taking part in all aspects of the system and will provide the expertise required to support the system once it has been implemented.

(2) All courses involved in the AIS have civilian instructors and supervisors working on the project. This provides continuity during the development and implementation of the system.

(3) Unique requirements for the Personnel and Training subsystem are being identified, and McDonnell Douglas Corporation is coordinating with the Instructor Training Division at Lowry AFB in developing new courses to support the AIS.

(4) Training support organizations are developing the capabilities required to support the AIS. These include such things as the production of super 8mm film, filmstrip, microfiche, carrels, and computer programming. Facility modifications and the installation of computer communications have also been required.

Future Instructor Training Requirements

Since the majority of the authors of instructional materials will be enlisted personnel selected from the instructor staff in a given course, they must be adequately trained in the areas of course design, the development of behavioral objectives and criterion-referenced measures, the selection and production of appropriate media, individual student differences, and computer-based instructional systems. The author of instructional materials will probably be part of an inter-disciplinary course development team, and this will determine the depth to which he is trained in any one area.

The self-paced, individualized classroom is different from the conventional lecture-discussion classroom. An instructor should be aware of the instructional system in which he will be teaching before volunteering or being selected for instructor duty. Some instructors do not want to be placed in individualized classrooms. Training provided for instructors who are going into individualized classrooms should be substantially different from that provided for the typical lecture-discussion classroom instructor. The instructor in the individualized classroom must be trained to deal with students on a one-to-one basis. Since many of these students with whom he will be dealing will be those having difficulty with the materials, he must have the patience and the concern to deal with these students. Academic counseling/tutoring and personal counseling will have to receive more emphasis in

his training.

In individualized courses more training will need to be provided in the areas of motivation and the management of learning incentives; managing learning time and achievement; the use of individualized student prescriptions; and the use of other computer-generated reports.

Individualized instructional systems are being built to produce better qualified technicians in less time. If this advantage is to be fully realized, students must be motivated to accomplish the training in less time. Course grades and other incentives should include both course completion time and achievement scores. These may even be adjusted to the individual student's abilities. In other words, the student may be rewarded based on the amount of effort he expends.

Individualized instructional systems that can be administered on a large scale are now becoming a possibility through the use of computers. The extent to which they are successful will depend on the acceptance of these systems by the instructors and their ability to develop the systems to their full potential. Instructor training programs hold the key to this future development.

APPENDIX A

A SYNOPSIS OF

U. S. AIR FORCE INSTRUCTOR TRAINING COURSES

3AIR75100-4, TECHNICAL INSTRUCTOR
264 Hours (6 Weeks, 3 Days)

The course is designed to train selected personnel to perform as Technical Instructors. The scope of training includes the learning process, instructional methodology, effective study, communicative skills, instructional system development, instructional aids, instructional management, measurement procedures and human relations. Practical performance in the course encompasses preparation of lesson plans and presentation of lessons utilizing the various instructional methods such as lecture, discussion, and demonstration/performance. Effectiveness and proficiency in specialized skills such as technical writing, programmed instruction, instructional system development, computer-assisted instruction, supervision, and counseling are gained through in-service training and on-the-job training.

3AIR75102-4, TECHNICAL INSTRUCTOR
(Condensed Version)

80 Hours (2 Weeks)

The course is designed to provide a review of instructional methodology with emphasis on actual teaching practice for selected personnel. The major subject areas included in the course are the learning process, effective study, instructional methodology, instructional system development, instructional aids, measurement, and human relations.

3AIR75110-X, ACADEMIC COUNSELING

36 Hours

This course provides standardized training for Air Force Supervisory and Instructor personnel whose duties include academic counseling. The course develops skills used to interview, counsel and guide Air Force personnel who are having problems which affect their work performance and achievement. Other subject matter includes units of instruction on human behavior; the fast, average, and slow learner; and counseling/interview techniques. Students perform in a counseling situation by performing in the role of counselor and counselee.

3AIR75111-X, LEARNING OBJECTIVES

36 Hours

The course trains qualified instructor personnel to develop learning objectives. The training includes technical training design, course control documents, principles and composition of learning objectives, criterion referenced testing, and composition of a plan of instruction.

3AIR75112-X, INSTRUCTOR'S ROLE IN SELF-PACED INSTRUCTION

36 Hours

This course provides training for qualified instructor personnel to improve the quality of instruction in self-paced courses. Training includes the purpose and use of self-pacing, the role of the instructor in the self-paced environment, the role of the student in self-paced instruction and practice teaching or observation in actual self-paced environments. NOTE: This is a new course and instructional materials have not been distributed to Centers to date.

3AIR75120-4, TESTS AND MEASUREMENT

36 Hours

The course is designed to provide formal professional in-service training for instructors, instructor supervisors, and personnel assigned to instruction and measurement units. The scope of training includes measurement concepts, objectives, course control documents, preparation of criterion tests and measurement tests, preparation of criterion checklists and performance rating scales, and procedures for administering, critiquing, and analyzing tests. The course is self-paced. Even though average completion time is 18 hours, students are given the full 36 hours of credit for course completion.

3AIR75130-X, INSTRUCTIONAL SYSTEM DEVELOPMENT

36 Hours

The course is designed to train course, branch, and department training personnel in the application of the ISD model to the revision of existing courses. Instruction includes application of the systems approach to course redesign and the preparation and use of typical course control documents and instructional materials.

3AIR75140-X, TRAINING SUPERVISOR

36 Hours

The course is designed to provide training for personnel selected for training supervisor duty. Instruction includes methods and techniques of supervision and course operating procedures based on existing command and center directives.

3AIR75150-X, TECHNICAL INSTRUCTOR REFRESHER

36 Hours

The course provides refresher training in instructional methods and techniques for technical instructors. Training includes ISD, ATC measurement, instructional aids, effective study, the learning process, communicative skills, instructional methodology, instructional management and the role of the instructor in human relations.

3AIR75170-X, LIBRARIAN

20 Hours

The course is designed to provide instructors and supervisory personnel with a working knowledge of the Base Library function. The course covers the basic skills in finding and using reference data. Scope of training includes the base library functions, use of the Dewey Decimal System and card catalogs, establishment and operation of training department/branch libraries, and practical exercises in library usage.

3AZR75200-4 (A&B), TECHNICAL WRITER

144 Hours (3 Weeks, 3 Days)

The A course is designed to provide trainees with the basic skills and knowledges required to carry out the duties of a technical writer for resident training materials, with particular emphasis on planning and production. The scope of training includes applicable Air Force and ATC directives and guidelines, grammar and composition, writing and evaluating objectives, and practical writing exercises requiring research, planning and editing.

The B course is designed to provide trainees with the basic skills

and knowledges required to carry out the duties of a technical writer for non-resident training materials (career development courses (CDC's) and extension courses (EC's)). The only difference in the two courses is the last block of instruction which provides for practical performance in the applicable training materials area.

3AZR75000-X, AUDIO-VISUAL METHODS

104 Hours

This course is conducted by the Instructor Training Division at Sheppard AFB. The course provides technical training in the more common phases of audio-visual courseware preparation for instructors and other qualified Air Force personnel. The course grauduate will be able to prepare storyboards and scripts, develop and produce audio-visual software. Examples of audio-visual software are slides, slide-tape programs, audio tapes, super 8mm single concept films and video cassette programs. Effectiveness and proficiency in these skills must be further developed through job experience.

APPENDIX B

INSTRUCTOR RECOGNITION

2-1. Policy. The instructor recognition program is established to emphasize the contribution of the instructor corps to the Air Force mission, to increase instructor prestige, and stress the desirability of these assignments. The program consists of designation of master instructor and instructor of the month.

2-2. Master Instructor:

a. This award, documented by ATC Form 630, *Master Instructor Certificate*, is earned by an instructor or instructor-supervisor who meets the following criteria:

(1) At least 18 months instructor or instructor-supervisor experience. Six months of this experience must be in a current duty assignment in which he instructs at least 24 hours per quarter.

(2) Accumulated 30 master points within the previous 5 years. At least ten master points must be earned in the areas of education, training techniques, or communicative skills.

(3) Complete one of the approved instructional system development (ISD) courses. All ISD courses are accredited as inservice training.

(4) Be a high school graduate or equivalent.

(5) Be recommended by his immediate supervisor and officer-in-charge as an exemplary instructor or instructor-supervisor.

(6) Receive approval for this award from the department chief.

b. Master instructor points are earned as follows:

(1) One master point for each 12 hours of inservice training taken within the technical school (maximum of ten points for each course).

(2) Two master points for each 12 hours of inservice training taught in the technical school with no double credit for the same course (maximum of ten master points allowed).

(3) Two master points for each semester hour of job related training earned through a college or university.

(4) One master point for each 30 hours of job related correspondence or other self-study courses.

(5) Selection as school FTD instructor of the month or quarter - 3 master points; center/FTD instructor of the year - 5 master points; ATC instructor of the year - 5 master points

2-3. Instructor of the Month. Each school will have an instructor of the month program. Airman instructor of the month winners are eligible for selection as center airman instructor of the year and command airman instructor of the year as prescribed by ATCR 900-4. The instructor of the month program includes:

a. Airman instructor of the month (mandatory).

b. Officer instructor of the month (optional)

c. Civilian instructor of the month (optional).

2-4. Instructor Recognition Program:

a. For an effective instructor recognition program:

(1) Establish procedures, in coordination with the base information officer; to obtain publicity in base, local, and hometown newspapers each time an individual is designated an outstanding instructor as specified in paragraph 2-3 above. Procedures should include arranging appropriate publicity for master instructors.

(2) Initiate favorable communications to the outstanding instructors (paragraph 2-3 above) and letters of appreciation to qualified instructors upon their permanent change of station or retirement. Forward copies of these communications to the

CBPO for categorization under AFM 900-3, chapter 11.

(3) Establish a program to gain community recognition for the professional status of instructors through assistance of local civic organizations.

(4) Encourage and assist instructors in their educational development through the Community College of the Air Force, Operation Bootstrap, and other educational programs.

b. Schools are encouraged to annually sponsor a school social, parade, or dining-in recognizing outstanding instructors.

c. Consideration should also be given to determining and establishing procedures which inspire the instructor's loyalty to and pride in his training organization. For example, raise the status of the instructor's position by:

(1) Improving living conditions of airmen instructors.

(2) Exempting instructors from details when possible.

2-5. Responsibilities. Schools will:

a. Implement instructor recognition programs as outlined in this regulation.

b. Use section I, ATC Form 10, to document accomplishment of requirements for master instructor.

c. Award ATC Form 630, signed by the center and school commander (or designated representatives) to those who meet the requirements.

APPENDIX C

ATC STANDARDIZED INSERVICE TRAINING COURSES

Course Number	Title	Length	*OPR
+3AIR75110-X	Academic Counseling	36 hours	Keesler/TTM
+3AIR75111-X	Development of Learning Objectives	36 hours	Keesler/TTM
+3AIR75112-X	Instructors Role in Self-Paced Instruction	36 hours	Keesler/TTM
+3AIR75120-X	Test and Measurement	36 hours	Lowry/TTM
+3AIR75130-X	Instructional System Development	36 hours	Sheppard/TTM
+3AIR75140-X	Training Supervisor	36 hours	Sheppard/TTM
+3AIR75150-X	Technical Instructor Refresher	36 hours	Keesler/TTM
+3AIR75170-X	Librarian (Self-Paced)	20 hours	Keesler/TTM
+3AZR75200A	Technical Writer-Resident Materials	3 wks 3 days	Keesler/TTM
+3AZR75200B	Technical Writer-Nonresident Materials	3 wks 3 days	Keesler/TTM
+3AZR75000-6	Audiovisual Methods	2 wks 3 days	Sheppard/TTM
+4AIF75193-006	Instructional System Development (FTD)	72 hours	Sheppard/TTM

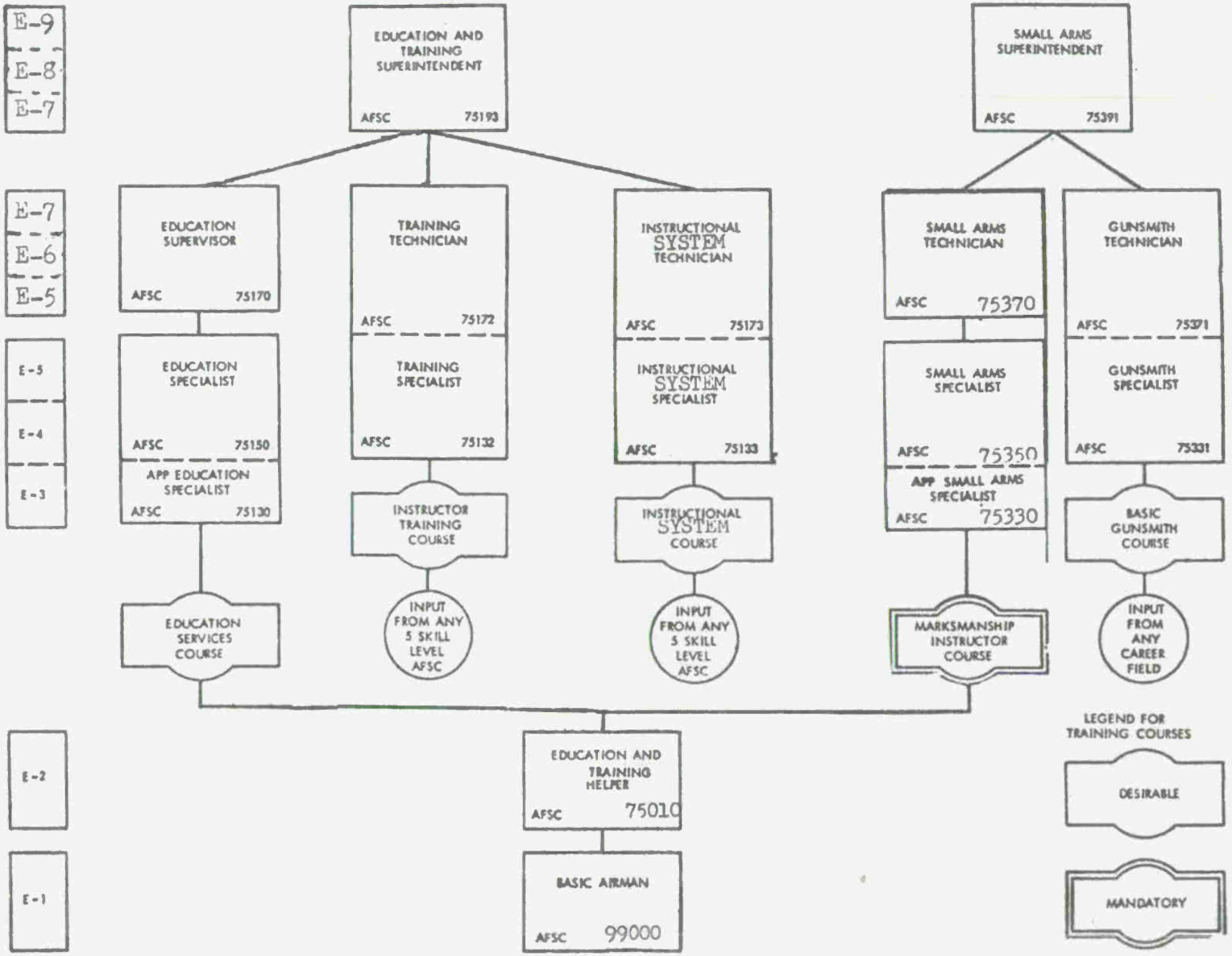
*OPRs are responsible for preparing all course control documents, training literature, and measurement tests.
+Accredited for inservice training and master points.

APPENDIX D

AIRMAN EDUCATION AND TRAINING CAREER FIELD (75)

1. The Airman Education and Training Career Field encompasses functions involved in the development and administration of formal training programs; supervisory training in methods and techniques of on-the-job training: OJT advisory services; career development courses; management training; small arms marksmanship training; gunsmith activities, including design, repair and modification of hand and shoulder guns; and planning and conducting courses in technical and academic subjects. This includes: educational tests administration; curricula planning; lesson preparation; oral presentation; small arms range operation; instruction and demonstration in small arms marksmanship; disassembly and assembly of small arms; care and cleaning of weapons; weapon range safety procedures; and the fabrication of training aids. This field also includes functions involved in administering off-duty education programs; counseling on United States Armed Forces Institute and civilian educational programs; maintaining educational services facilities, including office libraries containing educational materials, and bulletin boards; and administering General Educational Development and end-of-course subject matter tests. The field also encompasses functions involved in the application of the systems engineering concept to new or existing training curriculums and the development and administration of instructional systems and materials for any career field or subject matter area. It includes; feasibility studies; task analysis; development of criterion and enabling objectives; validation procedures; and the implementation of instructional system programs.

2. Excluded from this career field are personnel administrative actions, such as monitoring Program Technical Training (PTT), cross-training and skill upgrading, designation of Control AFSCs, applications and quotas for schools, and maintenance of personnel forms and records. These functions are included in the Airman Personnel Career Field.



★ Airman Education and Training Career Field Chart.

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INSTRUCTOR TRAINING IN THE NAVAL TECHNICAL TRAINING COMMAND IMMEDIATE FUTURE PROJECTIONS

Earl F. Griswold
Training Methods
Chief of Naval Technical Training

The training of instructors is vital to efficient, job relevant, technical training. Changes in Navy training philosophy generated programs in task analysis, course design/redesign procedures, and individualized learning. These programs in turn required new dimensions in the training of instructors and learning supervisors to prepare them to meet their responsibilities in whatever instructional situation they may encounter in fulfilling the duties of their assigned billet. This report will discuss: (1) programs impacting on instructor training, (2) plans for the extension of programs that will cause a shift of emphasis in instructor training, and (3) actions taken and planned to meet the requirements generated by these programs.

The organization of the Naval Education and Tra ing Command (CNET) and the several functional commands gave impetus to three programs that profoundly affected, and will have an ever increasing effect upon, instructor training: (1) the systems approach to curricula design, (2) Instructor Managed Instruction (IMI), and (3) Computer Managed Instruction (CMI).

CNET, 9 Oct 1974, distributed copies of an Instructional Systems Design Model (ISD) to functional commanders (NAVEDTRA 106, July 1974) for guidance in designing/redesigning curricula. Although the Chief of the Naval Technical Training (CNTECHTRA) has been following the systems approach for some time where new curricula were being revised or developed, this document specified the procedure in the form of an audit trail standardizing terminology. The actions taken by CNTECHTRA to carry out this procedure will be discussed later in this report. The ISD Model will form the basis for curriculum design training that instructor training schools must provide.

The second program impacting on instructor training is Instructor Managed Instruction (IMI). This is defined as "an instructional method which uses the Learning Supervisor (Instructor) to manage the student's use of a variety of learning resources available in a Learning Center." This methodology is self-paced, individualized instruction and radically changes the role of the instructor from that of a lecturer, discussion leader, demonstrator to a counselor and manager of a student's progress through a series of self instructional modules. This levied a requirement for Learning Supervisor training on the instructor training schools

that will grow in demand as self-paced individualized systems increase in number.

The third program, Computer Managed Instruction, will be described in more detail due to its unique application. It is defined by CNTECHTRA as "an instructional method which uses a computer to manage the student's use of a variety of learning resources, avilable in the Learning Center." The computer also maintains records on a student's progress through a course and generates reports.

In a computer managed system the computer is programmed to make a decision as to which of the available modules, or units, of instruction is best suited to further the learning of each student at each point in his progress through the course. These modules are programmed at various levels of difficulty. Additionally instruction is adapted to the individual requirements of students by three other means: (1) loops within a module, (2) repeating a whole module if it is not learned adequately the first time, and (3) branching within a module in response to student answers at certain check points.

All material included in the course is closely related to work performance and is "validated instruction." The material is tested and revised to meet crieria set by the requirements of the tasks the man must accomplish when he is assigned to an operational unit.

Since this is an individually paced instructional system, it is necessary to package each instructional module for individual presentation. For the most part the modules are presented by individual audio-visual devices or by programmed instruction booklets. Visual presentation by means of microfiche, which provides ready access to any one of 98 pages of diagrams, pictures, or written material per card, is also used in certain instructional modules. It is also used extensively in presenting test questions.

The Computer Manged Instruction project was initiated by the Chief of Naval Air Technical Training (now CNTECHTRA) in July 1967. It was approved by the CNO and subsequently included in the Navy's Advanced Developed Objective 43-03X (Personnel and Training), under the Chief of Naval Personnel. In April 1971, the CNO approved CMI for operational introduction.

Memphis State University (MSU) located 20 miles from the Naval Air Station has provided computer support under a series of contracts. Upon delivery of the Navy inhouse CMI Computer System, fourth quarter FY75, the CMI software will be converted to execute on the new equipment.

The CMI classroom terminal subsystem consists of a Mark sense optical scanning device, a cathode ray tube (CRT), and a non-impact thermal printer which interface with each other. The Mark sense optical scanner

serves as a student test input device. Its function is to optically scan the student's test and transmit the data to CMI processing programs. The scanner can read up to 350 sheets an hour and is equipped with the ability to reject errors to a special hopper and continue reading.

The cathode ray tube (CRT) serves as both an input and output device. Its primary function is for computer control: to sign on and off the central processing unit, initiate the CMI programs, and query the CMI files. Its secondary function is to present temporary displays of learning guides and answers to query questions. The non-impact thermal printer produces hardcopy of learning guides and query answers.

The CMI computer software provides for such functions as student registration, record keeping, tracking student progress, grading of papers, and statistical analysis. By far the most important function of the CMI system is to direct the learning activities of the student. This is accomplished primarily by the generation of "learning guides." It is by means of these learning guides that students are directed to off-line, multi-media devices and materials.

An initial learning guide is presented to the student when he reports to his learning center. In addition to study assignments, the learning guide provides the student with a projected completion date. This is the date on which, based upon his aptitude, he should be able to complete the course. The computer will track and evaluate the student's progress and assign remedial night school if it appears that the student could fail to meet his projected completion date.

The student studies the instructional modules and takes progress tests which he inputs to the computer. The computer responds to those tests on which the student failed to reach criterion by assigning remedial tests on subsequent learning guides.

Inputs to the system are also made by shop instructors upon successful completion of practical work. A comprehensive end-of-course test covering all specific objectives of the course is administered to the student when he has completed all instructional modules.

It can readily be surmised from this brief description of the CMI system that specialized training for Learning Supervisors and other personnel operating the CMI system is necessary. This specialized training is offered through an inservice training program detailed later in this report.

The second part of this report is an enumeration of the plans for the extension of the programs previously discussed and the bearing these plans will have on the training of instructors/learning supervisors.

The design/redesign of curricula is a continuous process. Some programs in Job Task Analysis were underway at the time CNET and the attendant functional commands were organized. This procedure was accelerated by funding a Modified Task Analysis program being used by the Individualized Learning Development Group (ILDG) Service School Command, San Diego. This system was not to operate in lieu of the approved Navy Occupational Task Analysis Program (NOTAP) but rather to augment it. The NOTAP is long range, thorough, and has wide application in addition to training. The Modified system did provide an immediate source of data upon which to base curricula revision to achieve a degree of job relevancy. As NOTAP Job Task Inventories become available, the curricula, developed under the Modified plan and several other plans conducted under contract, will be reexamined and revised as necessary. Figure 1 illustrates the progress made to date on the five phases of the ISD Model. However, it must be reemphasized that this program is continuous and periodic recycling will occur.

ISD MODEL PHASES

	I	II	III	IV	V
COMPLETED	73	56	50	38	C
IN PROGRESS	6	17	5	13	O
NOT STARTED	2				N
TOTAL	81				T
					I
					N
					U
					O
					U
					S

Figure 1: CNTECHTRA CURRICULA REDESIGN PROGRESS (BY RATINGS)

Another program that will have a profound effect on curricula redesign as it evolves and is implemented is the Navy Enlisted Occupational Classification System (NEOCS). This is a study of the entire enlisted classification system which could result in combining ratings and restructuring of training levels. These actions will in turn necessitate the redesign of curricula.

Projected plans for the expansion of IMI in the Naval Technical Training Command are shown in Figure 2. The number of Class "A" (basic) School Courses are shown for each fiscal year.

FY					
74	75	76	77	78	79
13	24	11	11	11	8

Figure 2: CNTECHTRA INDIVIDUALIZATION DEVELOPMENT PROJECTIONS (BY "A" COURSES)

Essentially the courses with the highest input are projected for individualization first because of the possibility for greater savings. CNTECHTRA is committed to the individualization of all courses where feasible but of necessity the availability of manpower and financial resources will determine the accomplishment of the projections. The obvious implication for instructor training is a shift in emphasis from classroom type instruction to learning center instruction.

Figure 3 illustrates the latest projections for the expansion of CMI by Class "A" Courses, fiscal year, and location. The projections depend so much on outside factors, particularly equipment and funding, that exact projections are difficult. It should be noted that the expansions are in the largest activities. Some of the courses now under IMI or scheduled for IMI will be converted to CMI.

Again, the implications for instructor training are apparent. Specialized training for Learning Supervisors who will function in CMI Learning Centers must be provided causing an additional shift away from the training of conventional classroom instructors. The concluding part of this report will enumerate the actions taken and being planned by CNTECHTRA to cope with changes required in instructor training to accommodate the needs of these advancing programs.

LCDR Griffin in his report outlined the steps taken by CNTECHTRA resulting in a revised curriculum approved by CNET in April 1974. Concurrently an instruction was published setting up a flow system for the training of instructors, IMI learning supervisors, and CMI learning center personnel. Figure 4 is a copy of this flow chart. After an initial period of training common core to all instructional personnel, a break off occurs. Students who will occupy billets in a conventional system continue along Path 1 while those who will be operating in an IMI or CMI Learning Center will go to Path 2 or 3. Here these students receive another block of common core training related to individualized instruction. Following this instruction they report to their commands for inservice training.

It would be virtually impossible for the Instructor Training School

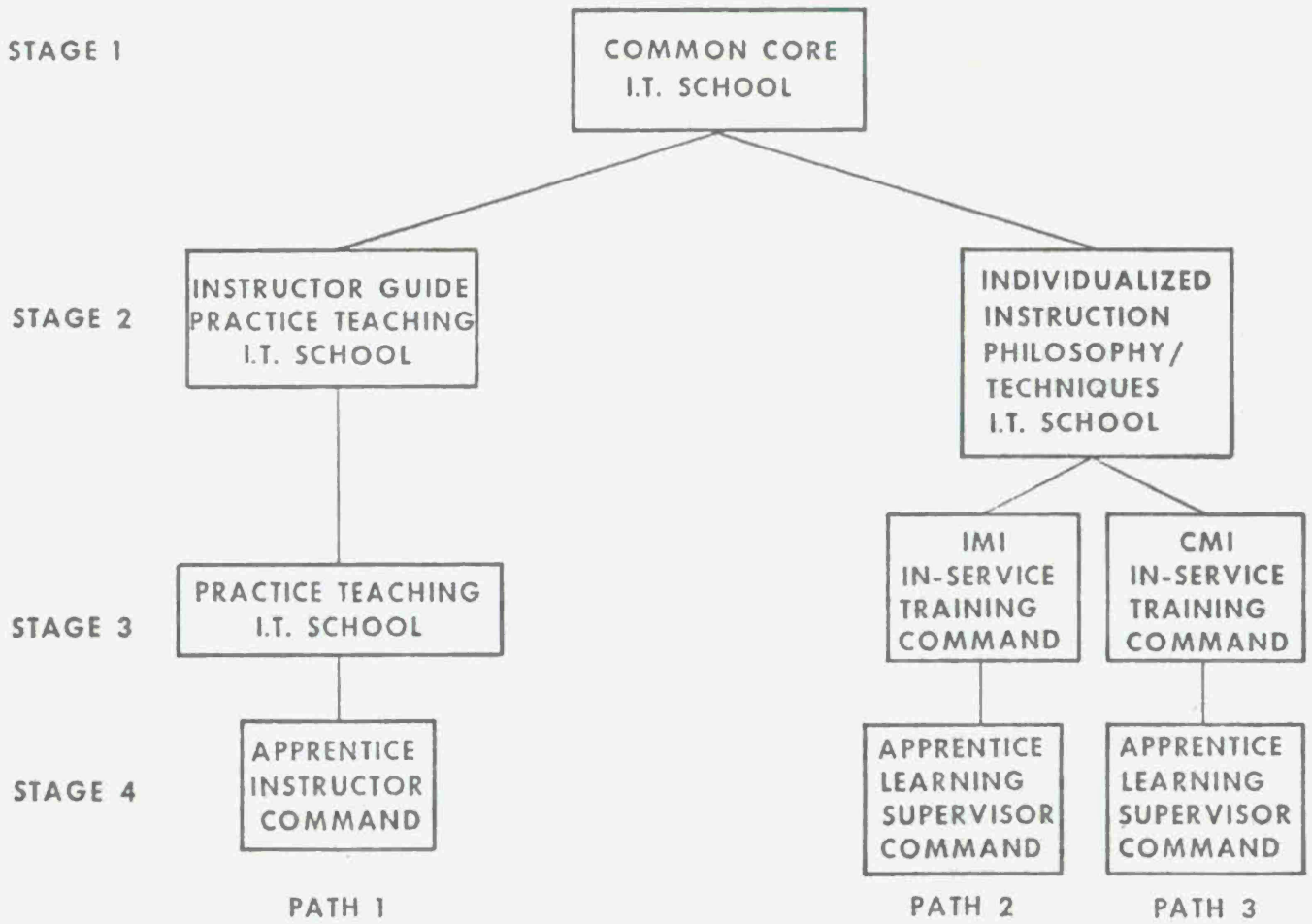
COMPUTER MANAGED INSTRUCTION PROJECTIONS

(BY CLASS "A" COURSES)

LOCATION	FY75	FY76	FY77	FY78	FY79
MEMPHIS	6		1	7	
SAN DIEGO	1		3	2	
GREAT LAKES	1	2	2		1
MERIDIAN					5

Figure 3

INSTRUCTOR TRAINING FLOW CHART



* INDIVIDUALIZED LEARNING SUPERVISORS WILL BE RELEASED AT THE END OF STAGE 2 TO THEIR ASSIGNED COMMAND FOR THE THIRD STAGE OF IN-SERVICE TRAINING.

Figure 4

to indoctrinate students in the peculiarities of each individualized system, therefore, this training is provided on the job. CMI training is particularly difficult because of computer equipment constraints and the need to train other personnel in addition to learning supervisors. This CMI training program has been developed in the programmed instruction mode and Figure 5 is a matrix of programs required for the various people who will function in the CMI learning situation. Presently, this training is conducted for an initial cadre of people from other training activities at Memphis. However, as equipments are placed in the other activities this training will be offered locally. The common core individualized learning block of instruction will be entirely self-paced and is under development by the Course Curriculum Model Manager, Service School Command, San Diego. Steps have recently been taken to provide needed support to speed up the development process.

In conjunction with the revised curriculum and plan for specialized training, a feedback system has been implemented to receive evaluations of instructor training from students after they have been on the job for six months. Figure 6 illustrates the feedback form used. When the student enters training he self-addresses a franked envelope. Six months later the survey form is mailed to him. The former student completes the form, staples it together, and places it in the mail. Results are summarized by CNTECHTRA every six months and copies mailed to each instructor training school along with the completed forms.

It is believed this system will produce a high percentage of return from those who had to put their training into practice. This plan has only been in operation for six months so completed forms are just starting to come in.

Manual (CNTT-AIO, Procedures for Planning, Design, Development and Management of Navy Technical Training Courses) was recently developed by a CNTECHTRA committee composed of a chairman from the CNTECHTRA Staff and three members from training activities. This is a "how to do it" publication and is based on the ISD Model insofar as the development of curricula is concerned. The stated purpose of the manual is "to establish procedures and provide accompanying sample formats which will be used by Navy training personnel at all levels in NTECHTRACOM down to the course level to produce technical training courses which are conducted by CNTECHTRA activities." The manual includes audit trails and definitions of terms. It will be the basic document for the topics in the instructor training course dealing with curriculum development and training management. The construction is loose leaf so as changes occur, they can easily be made.

Two projects yet to be undertaken are (1) revision of the Programmed Instruction Writers' Course considered basic to the development of individualized instruction modules, and (2) course design training which to this

LESSON MATRIX
CMI OPERATOR TRAINING

ASSIGNED PERSONNEL	DP-0	DP-1	DP-2	DP-3	DP-4	DP-5	DP-6	DP-7	OJT
LEARNING CENTER SUPERVISOR	X					X			
TESTING SUPERVISOR	X	X	X	X		X			X
WING SUPERVISOR	X	X	X	X	X	X			X
WING COUNSELOR	X					X			
REMOTE BATCH TERMINAL OP	X				X				X
CODERS	X		X		X		X	X	X

Figure 5

INSTRUCTOR TRAINING SURVEY

CNTECHTRA-GEN 1500/8 (6-74)

S/N 0197-TFO-2980

Help improve the Instructor Training Basic Course by completing the following survey. No signature is necessary. Fold, staple, and mail.

1. DID YOU VOLUNTEER FOR INSTRUCTOR DUTY? ☐ YES ☐ NO

2. HOW DO YOU FEEL ABOUT INSTRUCTING? ☐ LIKE IT ☐ DON'T LIKE IT ☐ NO PARTICULAR LIKES OR DISLIKES

3. WOULD YOU VOLUNTEER FOR A SECOND TOUR OF INSTRUCTOR DUTY? ☐ YES ☐ NO

4. *Place an "X" in the appropriate column opposite the topics covered in the Instructor Basic Course. More than one check per topic is permissible.*

TOPIC	A HELPED	B NO HELP	C MORE EMPHASIS	D LESS EMPHASIS	E NOT NEEDED IN PRESENT BILLET
a. FACTORS AFFECTING LEARNING					
b. TRAINING TASK ANALYSIS					
c. LEARNING OBJECTIVES					
d. CRITERION TESTS					
e. INSTRUCTOR GUIDES					
f. INSTRUCTIONAL METHODS AND TECHNIQUES					
g. INSTRUCTIONAL MEDIA AND TECHNIQUES					
h. CURRICULUM DEVELOPMENT					
i. COUNSELING					
j. EVALUATION OF INSTRUCTION					
k. TEST ITEM CONSTRUCTION					
l. PRACTICE TEACHING					
(1) ILLUSTRATED LECTURE					
(2) DEMONSTRATION/PERFORMANCE					

5. WHAT TOPICS, IF ANY, SHOULD BE ADDED TO THE COURSE? WHY?

6. INSTRUCTOR TRAINING SCHOOL ATTENDED *(Circle one)*

GROTON NEWPORT NORFOLK GREAT LAKES MEMPHIS SAN DIEGO

7. PRIMARY INSTRUCTIONAL DUTY *(Circle one)*

CLASSROOM LAB/SHOP INDIVID-UALIZED CURRICULUM DEVELOPMENT TEST WRITER COMPANY COMMANDER SUPERVISOR OTHER *(Specify)* _____

8. MONTHS ACTUAL TEACHING _____ HOURS PER WEEK _____ TYPE SCHOOL *(Circle one)* "R" "A" "C" OR "F"

9. THIS SURVEY COMPLETED BY ☐ ENLISTED INSTRUCTOR ☐ OFFICER INSTRUCTOR DATE

Figure 6

point was provided by the ILDG, SERVSCOLCOM, San Diego, and contracted training. This needs to be developed into standardized training offered as a formalized course by the instructor training schools.

In summary, CNTECHTRA realized early in the organization of the new Navy Training Command that changes in the training of instructors would be mandatory. Subsequently, actions were taken within the constraints of available resources to adapt training to emerging changes in training philosophy. Instructor training must of necessity remain flexible, and CNTECHTRA will continue to initiate action to provide prospective instructors with training that will equip them to meet their changing responsibilities.

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CHANGES PROJECTED FOR THE U. S. MARINE CORPS INSTRUCTOR TRAINING SYSTEM IN THE IMMEDIATE FUTURE

Lt Col Paul Roush, USMC
Head, Curriculum Development Division, Academic Dept.
Marine Corps Development and Education Center
Quantico, Virginia

In order to understand the direction in which the Marine Corps will be moving in the immediate future in its instructor training program, it is necessary to have an understanding of the scope of the tasks that accompany the billet of instructor.

The instructor in our school system is the person who presents information and who manages resources to attain specified student outcomes. He is, however, a great deal more. The instructor is also a course designer and constructs objectives and test questions. He is the person who prepares course documentation and most of the course materials, such as programmed texts, student handouts, and so forth. He is involved in some way in virtually every aspect of the instructional process. Accordingly, his training must be comprehensive, for he is not selected to be an instructor on the basis of prior educational experience that would equip him to serve in these roles.

Our next generation instructor training must be based in part upon continuing to do the things that are working well for us and in part upon responding to needs assessment. That is, we must close the gap between where we are and where we want to be. Frankly, we anticipate that for a number of reasons there will be minimum change from what we are now doing. First, we began the shift toward the systematic design of instruction about two years ago. Our experience to date has taught us that this approach, while conceptually very simple, is a lengthy and complex undertaking in the world where instruction occurs. Given the magnitude of the tasks the instructor must learn in order to function in his multiple roles, we believe that additional quantum changes should be held to a minimum until the process is more institutionalized. Second, the revision process is an integral part of the current program. Numerous incremental changes have occurred after each of the 15 courses conducted during the last two years. Accordingly, the current course is a significantly different offering from the initial one. Third, while we acknowledge that more time will be needed to fully validate the effectiveness of what we are doing, we believe the present course is accomplishing most of the things that it was intended to do. There are a number of areas where a shift in emphasis would be appropriate, but any change at this time will be evolutionary.

The Education Center at Quantico enunciates in its academic regulations four primary educational precepts. They are accountability, mastery learning, competency-based instruction, and criterion-referenced measurement. These precepts, if not formally stated at other instructor training

schools in the Marine Corps, are implicit in instructional design regulations which apply to the Corps as a whole. Changes that we undertake are generally in response to shortfalls in these areas.

As is true in many fields, the terms we use in education can become mere jargon. The meanings we impute to these terms must be defined. Accountability is an example of a term that means all things to all people. Its essence has to do with the ability to show that one has done what he said he would do. Because of the need to provide evidence of accomplishment, there is a heavy emphasis on documentation. For our purposes, accountability can best be described as responsibility plus documentation.

Mastery learning has a great deal to do with expectations. There must be commitment to the notion that nearly all students can learn nearly all tasks. Aptitude is viewed not as some fixed upper limit on one's ability but rather as the time needed to achieve mastery. Time for mastery is a variable which fluctuates with many factors - including teaching strategy, student learning style, and instructional media and materials.

Competency-based education requires that we examine the kinds of skills, knowledges, and other abilities that are required of the graduate of a given course in order to function on the job. Instruction is then developed to yield student outcomes in the classroom which at least approximate the competencies required in the field.

Criterion-referenced measurement is a rejection of the notion that student competence can be judged on the basis of comparative levels of achievement. It is a movement from a relativistic approach toward the reference point of preselected standards--standards that have their origin in field performance requirements.

The movement toward articulation of these four precepts has been very deliberate. We believe that adherence to their main tenets offers the best path toward success in training. As we evaluate the increasingly complex environment in which we must function and the anticipated requirement to justify expenditure of resources, it seems clear that these precepts are sound, not only for the next generation of instructors but well into the foreseeable future.

Accepting their validity as a given, we need to assess the extent to which these precepts express the reality of instructor competence. When there are gaps between where we are and where we want to be, we must consider revision of our instructor training programs.

With regard to accountability, we identified the twin criteria of responsibility and documentation. The former appears to be in excellent order. The Marine instructor carries out his multiple roles in the instructional process with enthusiasm, exceptional dedication, and great

skill, often with minimal resources and maximum constraints. This is one area where the future is as secure as the present and the past.

On the documentation side of accountability, the ground is not so firm. Lesson plans and related material are evident, of course, but they are stated mainly in terms of what the instructor does or what he intends to have the student do. If we had to produce evidence to an impartial jury that individual students possess skills when they exit our schools that they did not possess on entry, we might not be able to get convictions in some cases. That is not to say that the graduates don't possess those skills, but rather that the acquisition process within the school environment is not always documented.

The second precept, mastery learning, presents us with a number of paradoxes. We believe, for example, that mastery of given tasks is largely a function of time; yet most of our courses are conducted in a fixed time. We acknowledge that learning style and media selection are variables which can alter the time required for learning; yet some of our classes are conducted without providng the student with options in either of these areas.

The status of competency-based education must be assessed in terms of how closely the student outcomes following instruction match the competencies needed to perform in the field. In the past year instructors have converted previous purpose statements into a learning objective format which includes statements of behavior that will provide evidence of the acquisition of the intended outcome, the conditions under which the behavior will occur, and the level of proficiency to which it will occur. Nevertheless, we still have our share of properly formatted objectives that call for learning outcomes that either are not very significant or whose relationship to field requirements is quite remote.

A problem we have found particularly vexing is that of stating the performance requirements for the graduates of professional schools such as the Command and Staff College. Where there are potentially thousands of jobs to which the graduate could be assigned, and where the instruction must prepare him for assignments during a decade or more, the analysis of course requirements has been a rather unsystematic process.

Of the four precepts, the one which has caused us the least problem is criterion-referenced measurement. Recognizing that the criteria are not always as closely linked to field performance as they might be, our instructors have done a good job of basing their evaluation upon student acquisition of the competencies embedded in the objectives.

The foregoing review of our status with respect to the four educational precepts has necessarily been a very cursory one. It seems clear, however, that a discrepancy analysis would show the greatest gap between

what is and what should be in the first three areas; accountability, mastery learning, and competency-based education. Here is where we must have increased emphasis in instructor training in the immediate future.

There is a sense in which deficiencies in each of these areas can be subsumed under the common heading of evaluation. If evaluation can be defined as the process of obtaining and using information for making decisions, then some of the new learning tasks for our instructors in the immediate future begin to fall into place. The instructor must be able to recognize the types of educational decisions that he can make, and he must know what kind of information is required for each of them. He must then know where and how to get the information.

Examples of the kinds of decisions which the instructor might be called upon to participate in would include those pertaining to individual students or groups of students and those which deal with lessons, courses, or programs. For example, he would be involved in decisions about student selection, placement, or certification. He would make formative and summative decisions about his own lessons and provide feeback for curriculum decisions and for judgments about the support provided and procedures employed.

An evaluation information model could be employed to show the interrelationships between (1) the instructional contexts that are the focus of the evaluation, (2) data sources that would yield the information, and (3) collection methodologies used to gather the data. Additionally, any constraints that can be identified should become part of the model. Armed with an understanding of such a model, the instructor could act to reduce existing discrepancies.

For example, an ideal instructional sequence would be one in which the student is unable to accomplish a given objective when instruction begins, but does master it during instruction, and retains and is able to use the newly acquired ability over an extended period of time following instruction.

In order to document whether or not the instruction has proceeded in this direction, one would need to collect information from students using pretests, post-tests, and retention tests, as well as feedback from the field. By doing so, it could be shown that resources were not expended in order to teach what was already known. Additionally, evidence could be amassed to show whether or not graduates of a given course possess the competencies specified in the learning objectives.

In terms of mastery learning, especially in conjunction with fixed course length, an additional test--the curriculum-embedded or progress test, must be employed. Obviously, we can revise instruction on the basis of post-tests, but that is of little help to the students in the course at the time; if the objectives are not mastered, both the students

and the instructor can only find out after the fact. By testing throughout the instructional process, information could be gathered that would permit the instructor to intervene in time to assist the student to master the objectives during the course.

A second area to be emphasized here is the need for better intervention techniques. When student deficiencies are identified, the instructor should have available a full repertoire of tools in order to attempt remediation. An example of the skills that need improving is the ability to construct self-instructional packages that would include a variety of learning paths toward the objective and maximum opportunities for student practice and feedback.

In terms of competency-based instruction, we need to improve the instructor's ability to collect and use information to improve the precision with which he identifies course requirements, especially in soft-skill areas. Only in this way can we increase the assurance of teaching toward competencies that will alleviate performance discrepancies in the field. Unfortunately, the state of the art with respect to course requirements analysis in professional schools is very tenuous. Since this aspect of the systems approach already consumes a major portion of our effort in instructor training, it is not likely that we can justify commitment of more resources in this area until we have evidence of improvement in the state of the art.

In summary, the instructor training will remain fairly stable in the immediate future. The changes that occur will be evolutionary and will be in response to identified discrepancies. Areas which will receive additional emphasis include documentation of the learning process and improved tools for intervention in that process. The vehicle which will take the program from where it is to where it should be is an evaluation information model that will indicate the degree of congruence of actual instruction with an ideal instructional sequence.

Given the scope of the training necessary for an instructor in our system and the time and other constraints that we face, these goals offer a reasonable hope of attainment. The result would be an upgrading in our performance in terms of the standards implicit in the education center's educational precepts and a furthering of the ultimate goal of effectiveness in combat.

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A STUDY OF CENTRALIZATION OF NAVY INSTRUCTOR TRAINING SCHOOLS[1]

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One objective of the Training Analysis and Evaluation Group (TAEG) instructor training study is to evaluate the economic feasibility of combining the six instructor training programs into fewer locations than now exist. At this stage of the study, proposals are not being advanced for a centralized instructor training program. Centralization is only being considered as one of several alternatives which are believed worthy of evaluation as a feasible and perhaps more cost effective means of meeting future instructor training requirements.

Since the present training system is reasonably successful, one might inquire why a change should even be considered. Indeed, if significant changes are not anticipated in the way instructors are trained, then it may very well be that the training systems being used today are the most cost-effective. Even if changes in the instructional delivery system are anticipated, it is not a foregone conclusion that a move toward more centralized training is either economical or technically desirable. Certain economic aspects, as well as training methodological approaches must be examined in some detail to insure that, if change is proposed, the results will justify the resources expended.

Investments in new training systems are very expensive and any new undertaking must generate sufficient savings in the long run to make it economically efficient. There is a built-in inertia toward maintaining the status quo because new investments must be amortized, and resources forced into disuse may have no alternative use. The opportunity cost of using the latter resources for instructor training may approach zero.

The greatest impetus for change results from our changing needs and a dynamic technology which should serve those needs. A constantly changing technology makes it imperative in industry that a manager of an organization maintain an attitude of willingness to make adjustments in production techniques if the organization is to remain viable and competitive. Since one of the objectives in education and training of people is to develop and maintain an efficient training system, then the need, and indeed requirement, for accepting new ideas is no less important. It is axiomatic that efficiency in the use of our training resources should certainly be one of our prime objectives in the design of instructor

[1]This paper was prepared for the conference, but due to time constraints was not presented orally.

training systems. Ways in which training costs can be reduced while maintaining the instructional requirements must constantly be sought.

Reductions in the average costs of training which might be possible from centralized instructor training evolve largely from scale economies. Such cost reductions are only possible with the larger systems because we can use different types of resources and use them more efficiently. It is possible that a good deal of future instructor training could be done using computerized instruction. The effectiveness of this type of training system must be evaluated for its value as a pedagogical alternative--but that is only part of the story. It must also be an economically efficient means of instruction. Today, computers are relatively expensive items and frequently their services can only be acquired in discrete blocks. It may not always be economically feasible to develop and use a computerized system for a small training program. However, once the initial investment is made in a computerized system, the marginal costs of use are relatively low. This means that as throughput (or output of trainees) increases, there is a rapid reduction in the average costs of training. The average training costs for a large scale centralized training system may be significantly lower than for smaller systems which are forced to use less efficient technologies.

With instructor training being conducted at multiple sites, many resources are employed at less than their most efficient capacity. For example, library and administrative facilities are among those resources which need not be expanded in direct proportion to the number of instructors trained. The costs of acquiring and maintaining these facilities for a centralized training system may not be significantly higher than similar costs for any one of the existing training systems. One of the objectives, then, of the TAEG instructor training study is to determine the economic feasibility of providing the instructor training at one or more centralized locations. Following is a brief methodological outline and areas of emphasis used to evaluate the economic feasibility of centralized instructor training.

Few problems involving economic analysis of alternative strategies begin from "ground zero." with respect to resource availability. Instructor training is no exception. The feasibility of a centralized training system will depend, in great part, on the extent to which resources already available can be redirected or alternative uses identified. A first step will be to identify which resources can be released by centralizing the instructor training. Many of the resources currently used in instructor training will involve joint uses and must be retained in some capacity. For example, an administrator serving several schools, one of which may be the instructor school, will probably be required--even if the instructor school is removed.

Because of multiple resource usage, the only meaningful way of determining the potential cost of a centralized training system is to follow a marginal approach. One can count as savings from a centralized system only the "cost" or value of resources which would be released,

and these costs must be assigned to the alternative in which those resources are employed. When evaluating the status quo versus a centralized system, one must include in the real costs of maintaining the status quo the opportunity costs of those resources which could be released by converting to a centralized system.

One difficult question, although not unique to this study, is how to determine the opportunity costs of resources. To illustrate, how does one compute the real value of a vacated classroom loacted at any one of the current training sites? An attempt must be made to answer these questions in an economic analysis but often analytical methods are less than desirable. In gathering data for this study, each school administrator was asked to answer a questionnaire on their resource utilization. The emphasis in this questionnaire was placed on personnel utilization. The remaining data for our analysis will be obtained from secondary sources.

One of the most difficult questions we face is to determine the technical characteristics of such a centralized training system with their associated resource requirements. The analysis requires that we model the centralized training system, then use this model as the basis for comparison with the status quo. Already our study has shown that there appear to be some rather persistent and foreseeable trends in instructor training methodology. We hope to develop from these trends and from other sources, including this conference, a model for a centralized instructor training school. At present, we are planning to evaluate one and possibly two hypothetical centralized systems. The essence of our analysis will be a comparison of what the resource requirements would be should we go to a more centralized system versus what would be required to maintain the status quo.

An additional facet involves the impact on travel costs of changing to a centralized system. The origin and post-training assignment of students during the past year were used to determine travel costs. By assuming that origins and destinations will not differ significantly for future years, projections can be made of travel costs which would exist with both the present system and alternative sites for a centralized system. A rather rudimentary linear programming model was developed (of the transportation type) to select sites which will minimize travel costs. Preliminary results from this work indicate that any potential travel savings are not great and too few locations may actually increase costs.

There are many considerations in any decision to aggregate our instructor training programs which cannot be factored into the analysis in any meaningful quantitative way. The best we can hope to do in the analysis we are undertaking is to identify and make explicit those impacts which cannot be quantified. It remains the duty and privilege of those in positions of authority to consider the evidence and make the decisions as to the desirability of implementing a centralized instructor training system.

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OBJECTIVE II INTRODUCTION

This section of papers presents innovative concepts and ideas relevant to the long range planning for instructor training. A consistent theme in the presentations deals with proposals for change and prescriptive inputs which could be incorporated into an idealized design of an instructor training system appropriate to the final quarter of this century. Concern is shown for the changing military and social environment and the predicted technological and educational advances likely to occur over the next twenty-five years.

Successive papers in this section provide: a proposal for a tri-service instructor training academy; an overview of instructional systems of the 1980's and the requirements for instructors and instructional support; the implications of individualizing instruction for defining instructor and instructional support roles; an analysis of the issue of change regarding the role of the instructor of the future; and the impact of numerous change agents on the environment and the training of the instructor of the future.

Dr. Robert Morgan (Florida State University) articulated some informal perceptions on concepts attendant to long range planning for instructor training, but did not submit a formal paper for the proceedings.

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THE INSTRUCTORS' SCHOOL OF THE FUTURE

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The training of instructors, in and out of the military services, is an ancient and honorable part of the educational establishment, for at least a century in this country, teacher training has held an important place among educational institutions, with the so-called "normal schools" providing the genesis for many liberal arts colleges. The training historically provided by these institutions can be broadly divided into two major categories:

(1) subject matter knowledge, and
(2) pedagogical skills and techniques,

but there was (and is) a third very important activity which takes place at these schools, that of research and development in learning theory and techniques.

Military teacher training, or instructor training as we more commonly call it, differs significantly from its civilian counterpart in two significant ways. We bring to the teaching situation people who are already subject matter experts in their respective occupational fields, and we do not carry on research and development as a normal part of instructor training institutional activity. We are fortunate indeed in the first case, for the continuous influx of current subject matter expertise is very advantageous, helping to ensure that what is being taught is what is needed in the field. On the other hand, we are much less fortunate in that there is not an educational environment in the services' training establishments in which research and development, and perhaps even more importantly, the pilot modeling of research and development findings, can be conducted.

Over the years military instructor schools have met the requirement placed upon them in a reasonably satisfactory way. Because, as we have mentioned, the input to the schools is already a subject matter expert, the basic requirement of the school has been to bring to the new instructor a set of instructional skills which will permit him to prepare lesson plans, conduct classroom instruction in the classical fashion, and prepare tests to measure student success. He learns how to stand in front of a class and hold its attention, how to keep his hands out of his pockets while lecturing, and how to use the simpler teaching media such as slide projectors and the chalkboard. Some Navy instructors may receive an extra two weeks of post-graduate instruction in the authoring of programmed texts, but that about

covers the curriculum.

As most of us in this room, and perhaps training managers everywhere, are now painfully aware, however, the instructional role for which the kind of curriculum just briefly described prepares one, is simply no longer viable. The role of the instructor in the military training environment is changing very rapidly from that of the deliverer of knowledge and the teacher of skills to that of a manager of a complex instructional system and the developer of curricula which are based upon highly structured, technically complicated processes.

In other words, military instructors are becoming, or are having to become, instructional managers, and the level of professionalism, if you will, required of them is increasing tremendously. The underlying influence behind this change in roles is, of course, that discipline we know as educational or instructional technology. With some trepidation, and certainly with apologies to the experts with me in this room, I will address this technology as it is impacting upon the military training world.

At least in the Navy, and I think I can speak for all four military services, the definition of instructional technology is the one adopted by the Committee on Instructional Technology which reported to the President and the Congress in 1970...It is the definition which leans away from the narrower connotations of hardware technology to the broader concepts of systems design, objectivity and critical evaluation.

There are two major dimensions to the application of instructional technology which impact upon military instructors:

(1) The design and development of the instructional program, and
(2) the delivery of the instruction to the students.

The design and development of the instructional program is that function which we in the interservice committee addressing this subject have named Instructional Systems Development, or ISD. As you may know, the Inter-Service Training Review Organization has directed one of its committees to produce, with the major work being done by a contractor, a model for ISD, a complete set of procedural steps to accomplish ISD, bound in a set of volumes, and several instructional programs which will permit novice instructional technologists to engage in good instructional systems development. This work is proceeding apace, and will be completed in late Spring of this year.

When the procedures such as will be described in the ISD Manual are applied widely in the preparation of courses of instruction and other kinds of skill training programs, those who are responsible for education and training at all levels are going to have to have acquired a new level of professionalism in the art and science of instruction. Instructor training schools will have to spend much more time than is currently available to this technology, and the technologists who are the products of such training

will have to be recognized as such in order to make best use of them.

The delivery of instruction is also in a state of rapid change, change which impacts upon the role of the instructor. Individualized instruction, which has been demonstrated time and time again to be highly cost/effective in its reduction of training time, requires an entirely new set of skills on the part of the instructor, who in fact becomes the manager of an instructional system. In all the several training commands we are making giant strides in the application of computers to instruction, and in the Navy we are particularly busy placing the management of large, high density programs under the management of computers. The personnel who work in such an automated system must be very sophisticated about the total process, and are indeed a new breed of pedagogist.

There is another strong influence which will have a growing impact upon the training of instructors in the future, and that is the concept of interservice training. The Canadians tell me that the most significant gain from their unification of their Armed Forces has been the savings in training resources, and we can look forward in our military to stronger and stronger pressures from the Secretary of Defense and the Congress to realize these kinds of economies in our military establishment. Part of such savings can, in my opinion, be achieved through the common training of instructors, because we will soon have a common system for the development of curricula and the management of instruction. There are, amongst the four training commands of the armed services, forty instructor training schools. Forty schools which all have the same purpose, train the same kinds of people, and teach the same procedures must be a very wasteful system, and I will ask you to keep that fact in mind when we address the most likely method of correcting such duplication of activities.

There remains one other aspect of our current instructor training system which should be considered. Although the military training commands have in one fashion or another some means for having research conducted which is directed at their special problems, there is not to my knowledge any training environment in which research and development has a major role, or in which there is a major organizational component which has the mission of conducting pilot modeling of R&D outcomes for the purpose of proving or disproving the applicability of such outcomes to our training requirements. I would suggest that not less than ninety percent of all educational research carried on in the civilian sector is conducted in the university (or learning institution) environment. There is not a comparable climate in the military for such experimentation and stimulation of innovative thinking, despite the fact that the military education and training world represents a major segment of the national resources devoted to that function.

Now allow me to sum up what I have described. The military has forty schools for training potential instructors in the art of platform teaching. Yet we are on the front wave of a sweeping change in not only the concepts and procedures for developing instructional programs, which is part of an instructor's function, but the whole philosophy of instructional delivery is changing from that of instructors delivering infor-

mation to that of students learning in their own individual fashions under the general guidance and management of counsellors or proctors or even computers. And in none of these forty establishments is there anything going on which might be described as innovative thinking and practices designed to constantly improve our understanding of the training process. The solution to these problems which I wish to propose for your condideration, is "The Armed Services Instructor Training Institute". The proposition is as follows: Under the aegis of the interservice training review organization, the four training services will jointly plan, design, develop, build, implement and operate an institution which will serve the primary purpose of educating and training future instructional managers, classroom instructors to the extent they are required, and instructional technologists to the paraprofessional level. It will serve the secondary purpose of providing a site and an environment for the development of innovative instructional technology and the field trials of research and development outcomes which appear to hold promise of cost-effective application to military training.

There is a current requirement to train about eleven thousand five hundred instructors each year in the four military training commands. That represents a significant and major cost element in the total training budget of the Department of Defense, and it is my conviction that not less than ten percent, and perhaps as much as thirty percent of that cost to the taxpayers can be avoided under the concept just described. But savings is only one consideration in all our minds. Of equal or greater importance is the quality of our trained personnel, and it is my further conviction that the armed services instructor training institute offers a significant opportunity for generating first class instructional managers and technologists to meet all our needs.

The current objectives of the ITRO Committee on ISD, which I am privileged to chair, will have all been achieved by the end of May, 1975. It is my intention to recommend to the ITRO that the committee be given a new assignment...the planning, designing and development of the Armed Forces Instructor Training Institute. I ask each of you who is the least bit interested to give the idea your thought and consideration, and to communicate with me if you have anything to offer in the way of suggestions for the achievement of this ambitious goal.

INSTRUCTIONAL SYSTEMS OF THE 1980's AND IMPLICATIONS FOR INSTRUCTIONAL SUPPORT ROLES

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I. Application of Instructional Technology in Achieving Training Goals

Within the last few years programs or systems have been developed which drastically alter the process by which instruction is conducted. While certainly not new in concept or in the employment of individually administered instruction, these systems employ technology - instructional technology - in mainline instruction. Prior to this time instructional technology, such as programmed instruction, structured study material and audio-visual aids were used as adjuncts to instructor-led classroom operations. Of course in countless classrooms the use of instructional technology continues in an adjunctive role. In the civilian sector attempts to show superior effectiveness for applications of instructional technology have met with mixed success. Jamison, et al, (1974), after surveying a large number of studies conclude that these technologies should be used in mainline instruction where the likelihood of providing superior results is greater.

Military training is driven by a somewhat different set of constraints and goals than education in the civilian sector. These goals include reduction of cost of training, increased post training skill levels, increased job relevancy of training, reduction in the number of highly technical personnel required to operate training systems, and greater adaptability to such factors as shifts in student load, changes in student characteristics and changes in the way training is distributed between resident schools and duty stations. The cost is a particularly sensitive factor because in the military, students are paid and supported during training. In a study by Battelle, et al, (1973) a sensitivity analysis of cost factors associated with training indicated that variations in training time accounted for the largest variations in cost, especially in large volume courses. The second most critical factor was cost of preparation of instructional materials, In this study reduction in number of instructional personnel resulted in relatively smaller cost savings than the two factors mentioned above. The study concluded that the application of instructional technology to mainline instruction could result in substantial savings in military technical training. Other training goals as well as cost reduction are important and any new instructional system must achieve the other goals as well as cost reduction goals.

The type of design which seems most likely to achieve the training goals is one characterized as having modularized, individual or self-administering instruction having the potential for a variety of media of instruction in which students proceed at individual rates rather than in a fixed pace of a class. Also, such a system design maximizes the potential for incremental development and upgrading.

The remainder of the paper addresses issues and capabilities required for the effective operation of individualized instruction. It must be remembered that a substantial amount of training will continue to be classroom or group instruction because either that is the most appropriate method for the training or because of the sheer magnitude of effort needed for development of individualized instruction. A discussion of classroom training in transition would require a separate paper. Further, it should be noted that the concepts and techniques upon which individualized instruction is based can probably be modified for application to team and work-group training.

II. Individualized Instruction

When instructional technology is applied to mainline instruction, it becomes necessary to focus on the instructional path or history of each student individually. This probably accounts for the term individualized instruction. British military psychologists refer to this type of instruction as free-running courses, which is probably more descriptive and accurate given the current state-of-the-art of effectively individualizing instruction.

Although individualized instruction means many things, it usually includes at least the following:

1. The individual student receives instruction in a one-to-one relationship with instructional materials often employing structured learning materials and instrumentation. The bulk of the instruction is not delivered through group or class presentation. Thus, the instructional materials are modular and packaged for presentation to an individual in a self-administering form.

2. Students proceed through the training at different paces - often self-paced within restrictions.

3. Several media and modes of presentation are used.

4. A mastery criterion for achievement is imposed before a student can proceed to the next unit or course module.

Currently operational systems are lacking in techniques or technology to provide instructional sequences which: (1) truly adapt to student learning characteristics, (2) optimize selection of media or sequence of training material for student characteristics and for types of learning, and (3) optimize specified outcomes across populations of students by

varying resource utilization and training time. When individual students are the unit of attention, an enormous amount of information on the current status and progress of each student must be collected and processed and the number of instructional decisions is greatly increased compared with those required in group-paced classroom operation.

Although individualized instruction can be conducted by manual information handling methods, it is generally agreed that for large volumes of students some form of computer assistance is necessary. Certainly for the application of optimization of instruction on an individual basis, the decision rules, logics, or models must be implemented by computer programs. The Army, Navy, and Air Force are all in the process of developing or implementing individualized instruction employing computer management of instruction. The Air Force is developing the Advanced Instructional System (AIS) at Lowry Air Force Base, Colorado and the Army is developing the Computer Training System (CTS) at Fort Gordon, Georgia. Both employ computer managed instruction with off-line instructional media, though they differ considerably in computer system architecture. The Navy has completed a test and evaluation of a CMI system which is now in operation on a substantial scale at two training centers. This system was developed as a joint project by instructional personnel at CNTT Memphis and personnel from the Memphis Branch Office of the Navy Personnel Research and Development Center.

In a report on the evaluation of the system (Johnson, et al., 1975), the system operation is summarized:

> In summary, then, an attempt was made to design an instructional system in which most of the instructional materials would take the form of off-line, self-administered packages or modules and most of the testing would be done off line with answers recorded on machine-readable answer sheets. The computer would be used for such things as test scoring, the diagnosis of student deficiencies, the assignment of tests and both new and remedial instructional materials, the tracking of students through the materials, and the preparation of various reports required for student management. Computer terminals would be shared by a number of students. (Johnson, et al., 1975, p. 5).

The two courses used for the evaluation were the Aviation Familiarization Course, Class P and the Aviation Mechanical Fundamentals Course, Class P. Later CMI was extended to the Basic Electricity and Electronics portion of the Avionics Technician Course. Initial assignments were made by the computer. Tests were taken off line and input by means of an optical scanner from answer sheets. Remedial assignments were provided by the computer which told the student which parts of a module he had failed. Following remedial study he was retested on those parts he had failed using alternate test items. After taking a specified number of remedial tests in a given area without meeting the criterion, he was told to report to the instructor for more assistance. A number of daily records on student progress were prepared for instructors, including predicted position in

the course using multiple regression equations based upon data on student aptitudes. When a student's actual progress fell a specified amount behind his predicted performance, he could be sent to night school to catch up. At the conclusion of the course each student received a grade computed by the program, which consisted of a weighted average of his performance on the end-of-course examination, time in the course and, when appropriate performance in the shop.

In this system, instructional personnel no longer performed the roles of presenter of information and pace setter for progress of the class. Instead they responded to test and status information which was collected, formatted and output by the computer. They also provided additional remediation when the pre-planned remediation was inadequate. During the evaluation period they also provided redundancy by maintaining status and remedial assignment information on students. This was because certain types of input errors resulted in student records being garbled or lost entirely. It was estimated that instructors spent one third of their time on these redundant duties. When most of these deficiencies in the system were corrected fewer instructors were needed to manage blocks of students.

The system was successful in meeting the goal of supporting individualized instruction to reduce training by approximately 50% and was judged operationally feasible. It has since been expanded to assist in management of instruction in part of the Aviation Machinist's Mate J (Jet) Course, Class A at Memphis and the Basic Electricity and Electronics Course, Class P at the Service School Command, San Diego. Current on board load in all courses under CMI is in excess of 1500 students. Plans have been made for a sizable expansion of the system to other courses both in Memphis and in remote locations.

Thus, we have a description of an early implementation of a computer supported individualized instruction system. From experiences such as these with individualized instruction as well as experiences with computer assisted instruction, which is another form of individualized instruction, six major functional requirements can be identified as crucial to the successful development and operation of such a system.

III. Major Functions which are Necessary for Effective Individualized Instruction

The requirements to produce and operate an individualized instruction system can be grouped into six major categories of functions or operations. The degree or level of accomplishment of these functions is dependent upon the state-of-the-art of techniques and technologies, the relative need in terms of student population characteristics and types of training, and interactions of institutional constraints and goals. At any point in time a given instructional system design will reflect trade-offs among state-of-the-art technologies and system constraints.

The major functions are the following:

1. Requirements Analysis.

This includes task analysis, derivation of training objectives, training analysis including delivery system components design, and descriptions of projected student population in terms of entering behaviors, capabilities and learning characteristics. This is the front-end analysis of a systems approach to instructional design.

2. Methods for Presentation of Instruction.

There should be a one-to-one relationship between the learner and instructional material or events. It is generally considered necessary to provide for the recording of student responding and practice of the skills. The assignment of an instructional sequence to an off-line media or to CAI depends, in part, upon how crucial for effective learning is the need for stimulus focusing and frequent practice with response monitoring.

3. Tracking Student Performance and Progress.

When the individual student is the focus of attention, a large amount of information about student performance and student trail through the instruction must be acquired, analyzed, used for real time decision making, and summarized for instructional support personnel. This information must be acquired either by manual means or by computer terminal input devices. A major issue here is how extensive and how frequently must such information be acquired for effective instruction.

4. Diagnosing Student Difficulties and Making Decisions about Appropriate Actions.

These functions are the crux of the system. In current systems, both CAI and CMI, only the most prosaic diagnostic rules are employed. Generally, performance on module post-tests is used to detect deficient performance and the student is directed back to instructional material related to items which he failed. Sometimes the instruction is an alternate sequence on different media or in a different conceptual organization. Decision rules need to take into account characteristics of the student and, where possible, the student aptitude by instructional method interaction.

5. Continuing Evaluation and Revision of Instructional Materials and Strategies.

This evaluation is performed for the purpose of pinpointing and correcting deficiencies in instructional material. During the early phases of system implementation, this type of evaluation can result in drastic improvements in system effectiveness. However, such evaluation must continue throughout the entire life span of the system. Because most of the variance in output effectiveness is controlled by instructional materials

and strategies, continuing evaluation is necessary.

6. Optimizing Instructional Goals Across the Student Population.

Assessing of student difficulties is concerned with the moment-by-moment and lesson by lesson sequencing and routing of an individual student through instructional experiences to optimize individual learning. When the concern is with a characteristic of the distribution of student output measures, then different kinds of optimization rules must be developed. These rules will assign different students to different types of instructional sequences for different periods of time in achieving the desired output characteristics. This type optimization becomes a possibility because individualized instructional systems contain many alternative types and sequence of instruction as well as the capability to vary and control time within these sequences.

Each of these six areas of functional requirements must be achieved at some minimum level if individualized instruction is to operate at all. For example, if the front-end analyses were bypassed entirely or inadequately done, it would probably be impossible to prepare instructional materials and criterion-referenced test items. If adequate provisions are not made to acquire student pefformance data at sufficiently short intervals, student performance may fall below expected standards and not be detected before much time is wasted and remediation is made more difficult. When a system is designed, each of these functional areas is implemented by trade-offs between state-of-the-art capabilities, cost and other system constraints, and the learning requirements of the projected student population and of types of training. State-of-the-art capabilities are rapidly changing especially in computer terminal devices, memory, and software. Audio-visual devices, especially video technology, are also developing rapidly. Techniques for more sophisticated instructional strategies and optimization of output characteristics will become available in the 1980's. Systems being designed or implemented today should be designed to enable incorporation of advances in techniques and technologies. Otherwise these systems, which represent relatively large capital investments in the training organizations, will face serious problems of obsolescence by the 1980's.

IV. Projected Technologies and Implications for Instructional Systems of the 1980's

In this section some trends in technology which have implications for upgrading these systems will be discussed. Each of these projected technologies could upgrade or enhance one or several of the major functions which were described in the previous section.

A. Student Terminal Technology

There is need for an improved multimedia presentation and student interaction capability. Current and projected plans for CMI systems provide combinations of off-line multimedia devices. Multimedia devices under

computer control with student interaction capability are needed for some types of training and for some students having learning problems. In addition, there would be great cost savings for materials preparation if the devices were such that editing and revisions could be made in instructional content by changing information on a magnetic storage medium.

1. Video Disk Computer Controlled Multimedia System.

One of the most revolutionary systems for instructional delivery will be the video disk. Although not commercially available now, several companies, MCA/Phillips and TELDEC, may be expected to be marketing before the end of 1975. The video disk is a revolutionary delivery system becuase it is capabile of holding more audio and video (in color or black and white) information at less cost than any current media such as film or video tape. For instance, on a mylar disk the size of a standard record album, one could store a one-hour motion segment, in color with sound (and in stereo if desired). Large companies like MCA, whose subsidiary is Universal Studios, plan to market video disk at a cost of $1.99, to $9.99 including titles such as, "The Sting", "Gone with the Wind", and other entertainment programming. While the home entertainment market will be big (the playing device attaches through the antenna outlet of any standard television), the educational market will also be developed.

What makes the video disk especially interesting for instruction is that it can be randomly accessed under control of a computer by using a track for addressing. Thus, one could access individual frames, motion sequences with or without sound, or sound alone off the disk. By combining the power of television, computers, and the video disk technology a new vista of multimedia instructional delivery systems evolves. Properly programmed, a system could individualize instruction by media type, level of difficulty, remediation, color and other visual media requirements. This would be accomplished through one presentation form, all interactive through a keyboard connected to the computer and therefore responsive to the student in real time.

2. Stand Alone CAI Terminal.

Current CAI systems consist of terminals, or clusters of terminals, connected to large network computer facilities or groups of terminals connected to relatively smaller computer systems operating in a dedicated CAI mode. The technological capability now exists to design and build a single instructional terminal having its own central processing unit and storage and to achieve a per terminal cost which is much lower than per terminal costs of the two configurations mentioned above. In addition to the central processor and associated high speed memory, the terminal would employ a CRT display, keyboard, and low cost diskette storage unit. Further, the system would be capabile of implementing one or more higher level programming languages. After engineering development of interfaces and system software development, current hardware costs in small quantities are estimated at about $10,000 per unit. In three or

four years it is estimated that these costs in small quantities may be as low as $3,000 per unit.

Each of these devices can enhance the presentation capabilities of an instructional system and can bring multimedia presentations under the precise control of instructional strategies. Also, use of these devices could result in drastic reductions in cost and turnaround time in the editing and revision of instructional materials. They would not replace an existing instructional system but rather would represent upgrading of some components within it.

B. Curriculum Design and Lesson Materials Preparation

Preparation of instructional materials is a major impediment to the expansion of individualized instruction into additional applications. A number of techniques and technologies are being developed which can facilitate instructional materials preparation.

1. Student Study Management System.

The objective of the technique is to cause the student to process information contained in study materials in a manner which results in more effective learning. This is done by interspacing specially designed questions at intervals within the instructional materials and requiring correct responses before permitting the student to proceed in the course. Existing instructional materials are used, thus, greatly reducing the resources needed in preparing materials. The technique has been developed and tested in academic courses, but it is believed to be applicable to those portions of technical training in which students must learn from information contained in text including charts, diagrams, tables, etc. The technique was developed by Professor R. C. Anderson and his staff at the University of Illinois under contract with the Navy Personnel Research and Development Center. (Allessi, et al., 1974.)

2. Use of Lesson Design Procedural Guides.

Instead of requiring lesson authors or designers to develop their own procedures and instructional strategies, a set of procedural steps, usually expressed in flow charts, can be developed. An example is the lesson design procedures developed for the Army's CRT system (Kimberlin, 1973). Figure 1 is an example of one lesson type. Within this procedural guide there are seven different lesson types: pretest criterion problem, prior performance branch logic, skill frames strategy, practice problem strategy, post-test criterion problem, task element problem, and lesson test strategy. These guides can greatly reduce the production time and also serve as training aids for new lesson designers. In future systems a variety of design guides will be stored in computer memory to be called up in CAI like programs. A given set of instructional methods and procedures can be incorporated into the design of both the terminal hardware and the operations expressed in the CAI language. The TICCIT system represents this approach.

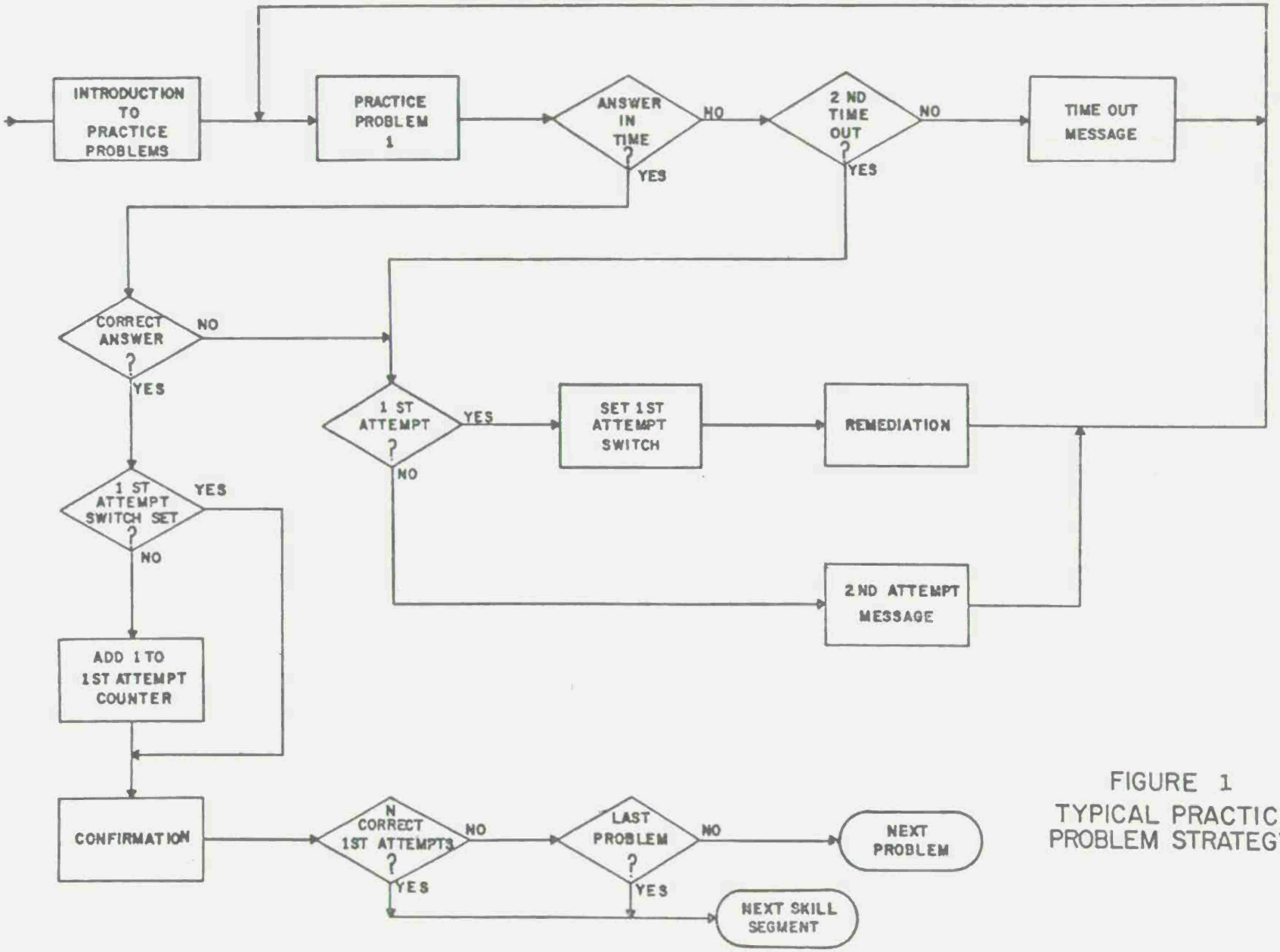

FIGURE 1
TYPICAL PRACTICE PROBLEM STRATEGY

3. Use of Network Systems to Assist Instructional Design Teams.

A network system consists of computer terminals distributed geographically and connected by communication lines to one or more computer systems with access to large on-line data bases. In this application terminals would be located at major training bases or all the services for use by instructional design personnel and others, such as administrative personnel. Two such network systems are being planned. One is the Training Resource and Applications Information Data Exchange System (TRAIDEX) which will permit access to a data base of training resources covering samples of task analyses and all intermediate design products and lesson materials. The second is the Automated Data File on Instructional Technology (ADIT) which will contain abstracts of research and evaluation reports on instructional techniques and technologies. If these systems are implemented in terms of their current specifications, they will provide valuable assistance in curriculum design and materials preparation. Development of these systems is under joint services and Defense Advanced Research Projects Agency sponsorship.

An additional capability which is not currently planned for in the systems described above would allow persons at two locations to access the same set of files and to demonstrate or execute lessons and exercises which are stored as programs in the data base. In this way lessons, tests, and other procedures can be shared, discussed and critiqued by persons at different training centers having common needs or problems. The PLATO system has this capability.

Probably the greatest potential use of network systems in the support of military technical training is represented by applications to assist in instructional design.

C. Instructional Strategies

In current systems the detection of student deficiencies is based upon analysis of post-test results. If diagnosis of student difficulties beyond this is required, the instructor must make such diagnosis. What is lacking is either: (1) a representation of the subject matter which would permit an assessment of the state of the student in terms of what must be learned or (2) a model of the student in terms of variables such as memory processes, motivation, cognitive skills, learning styles or affect.

The diagnosis of individual student difficulties and the decision rules to control the sequence or type of instruction can be accomplished in at least three major ways: (1) by mathematical learning models, (2) by student control and (3) by use of instructional procedures in combination with models of the subject matter. In all three it is expected that advances in techniques will impact instructional systems of the 1980's. The first two will be described in this section and the third in the section on computer generated instructional dialogue systems.

1. Mathematical Learning Models.

At least two types of models are being developed which have potential for extension to more complex instructional situations. These are models of memory and regression models.

In the first, a mathematical expression represents the model of memory of a student for a list of items to be learned, for example, foreign vocabulary learning. Parameter values are updated during instruction and are used as a basis to select items to be presented in each trial or practice session. Developing appropriate models of memory and selecting optimal individual instructional strategies remain as difficult problems. Work is just beginning to extend these models to more complex instructional problems.

The second type of model is the regression model. There has been considerable use of regression models to describe the progress of students in CAI. Much less common has been the use of regression models dynamically to predict and prescribe instruction for individual students. Measures that can be used in regression equations include both student characteristics and student performance measures obtained during instruction. Thus, aptitude by treatment interactions having practical significance may be realized.

Work on both models of memory and regression models show promise for individualizing instruction in systems of the 1980's. The work in these areas is reviewed in a paper by Fletcher (1974).

2. Student Control.

Another method of instructional control is to relegate all or partial control to the student, but in practice this has usually meant partial control. In CMI systems control is usually turned over to the student during instruction using off-line media, the system control points being assignment to an instructional module and the module post-test. In CAI combinations of student and program control are often found. In TICCIT, for example, a learner control strategy is an integral part of the overall instructional approach. Each block of objectives is structured to enable the student to enter at any level and move around in the block by selecting instructional material in any sequence. Usually he can choose rules, examples and practice at two levels of difficulty, hard and easy. The program updates a student data trail and checks to insure that instruction on all major objectives has been selected and that some is at the hard level. The student must pass a post-test or he is directed to remediation. Strategies similar to but less complicated than these have been successful in non-computer based instruction. The TICCIT projects will permit evaluation of this strategy in CAI.

In a research study on CAI (Ford, Slough, & Hurlock, 1972), students were given the option within lessons of skipping certain parts

of instruction or of repeating those parts one or more times. The instructional sequences included remediation of entering behaviors, original training, drill and practice, review, and post-test remediation. Comparisons were made with students having instructional sequences controlled by branching conditions within the lessons. No differences were found in training effectiveness or time. A large majority of the students preferred student choice. It is important to determine the scope of application for this method in terms of types of training and student characteristics.

D. Computer-Generated Instructional Diaglogue

This is a general term used to describe a number of techniques which may be combined to produce an instructional dialogue capability. The approach is believed to be useful where training is required in responding to situations having complex contingencies, that is where the individual must learn skills such as probing for information and asking "What if" questions. The capabilities of such a system differ from frame-oriented or pre-stored instruction in several ways. First, the subject matter is represented in either an information structure or a mathematical model. Second, the program can accept student inputs statements in the limited subject matter vocabulary. Third, the system has a limited inference generation and checking capability.

An example of one kind of computer-generated instructional dialogue is the application of SOPHIE (Sophisticated Instructional Environment) for teaching electronic troubleshooting (Brown, 1974). Brown describes the instructional interaction which can be accomplished by this system.

> Our system is based around the scenario of a student attempting to isolate a fault in a given instrument. In this setting, SOPHIE would present the student with a circuit schematic of an instrument and, if requested, would automatically select and insert a fault of some specified degree of difficulty. The student would then try to isolate the fault by requesting various measurements under any instrument setting that he desires. At any time he can offer a hypothesis about what he thinks is wrong with the instrument and have the system evaluate his hypothesis. The evaluation would report to the student whether his hypothesis is consistent with what he should have learned from his measurements. (Of course, the particular set of measurements is not known ahead of time.) The student could also, at any time, replace a given component, but before it is replaced he would be queried as to what he thought was wrong with it. If his answers were correct, the component would be replaced. In those cases where he had only discovered a fault caused by a deeper fault, the replaced component would be reblown until he discovered the fundamental fault. If the student becomes stuck and cannot think of any faults which would explain the measurements he has made, he can ask for help. SOPHIE would then generate possible hypotheses which the student could explore. (Brown, 1974, p. 56.)

Other capabilities can be developed to evaluate student information probes and hypotheses, generate hints and evaluate partial solutions, and evaluate a student's plan of action before he starts asking specific questions. The major effort required is to extend this technique to other types of problems and situations. The Brown system as currently implemented is not feasible as an instructional delivery system except for limited experimental work, because it requires a large amount of memory on a PDP-10. However, the stand alone CAI system described earlier may be the solution to a delivery system which has the capacity as well as higher level languages needed to implement this kind of instruction.

E. Evaluation and Revision of Instruction

As stated earlier much of the variance in output in an individualized instructional system is dependent upon the quality or effectiveness of the instructional materials and decision rules which variably route students through blocks of instruction. Therefore, evaluation of instructional materials combined with feasible and timely materials revision methods are essential capabilities for these systems, whether completely manual, CMI, or mixed CMI/CAI.

It is important to realize that this evaluation and revision procedure results in more than marginal gains in efficiency of the system. Table 1 gives the results of student tryouts and revisions of three lessons which as originally developed produced effective learning but were judged to be slow.

TABLE 1

Median Performance on Three "Slow" Lessons

Tryout	N	Lesson Time (Min.)	Test Score (%)
Second	15	59	91
Third	22	37	95

From the second to the third revision median lesson times were reduced from 59 to 37 minutes while median test performance increased from 91 to 95 percent.

It was concluded that:

The efficiency of the revision process was found to depend critically on the CAI data management system. This data management system was revised several times on the basis of experience.

> The current version sorts all student data by objectives. Everything concerning a particular objective is automatically collected together and printed in one place by the computer, including pretest frames and posttest performance. This makes it easy for the course author to isolate the causes of poor performance. It is important to note that this procedure does not require large numbers of students. Even five or six students provide valuable information for course revisions. (Ford & Slough, 1970, p. 13.)

In a later CAI project the revision process was proceduralized as an aid for lesson designers. A flow chart of the procedure is given in Figure 2 (Hurlock, 1971). These are given as examples of kinds of revision procedures which have been developed. Systems of the future should provide sophisticated capabilities for processing on-line student performance information as well as methods for rapid editing and revising instructional materials.

V. Implications for Instructional Support Roles

Instructional skills and roles[1] are a function of delivery systems. The changes in skills required depend on whether the instructor is active in the development and continuing evaluation of instruction as well as in its use. The user/instructional role becomes less of a delivery system than in earlier systems. That is, lectures become a minor activity for these personnel though there may be a considerable amount of individual and small group tutorial activities. Instead, instructor roles are more concentrated around those associated with instructional management, including monitoring, diagnosing, and prescribing student activities. The instructor must make decisions about group versus individual instruction, use of delivery systems, and have enough knowledge of the generic characteristics of media to aid in diagnosis and prescription for students. Thus, they will have to be skilled at entering, retrieving and interpreting student information from the student data management system.

The designer/instructor must be able to perform duties similar to the user/instructor but additionally must have knowledge of production, cost and development requirements of the materials for delivery systems. Most instructional design groups in current individualized systems have specialized team roles. These roles will probably become more specialized or will require higher levels of skills. Some typical roles will include task and training analysts, lesson designers, media materials producers,

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[1]The information in this section is based upon ideas suggested by Dr. Dewey Kribs of our staff.

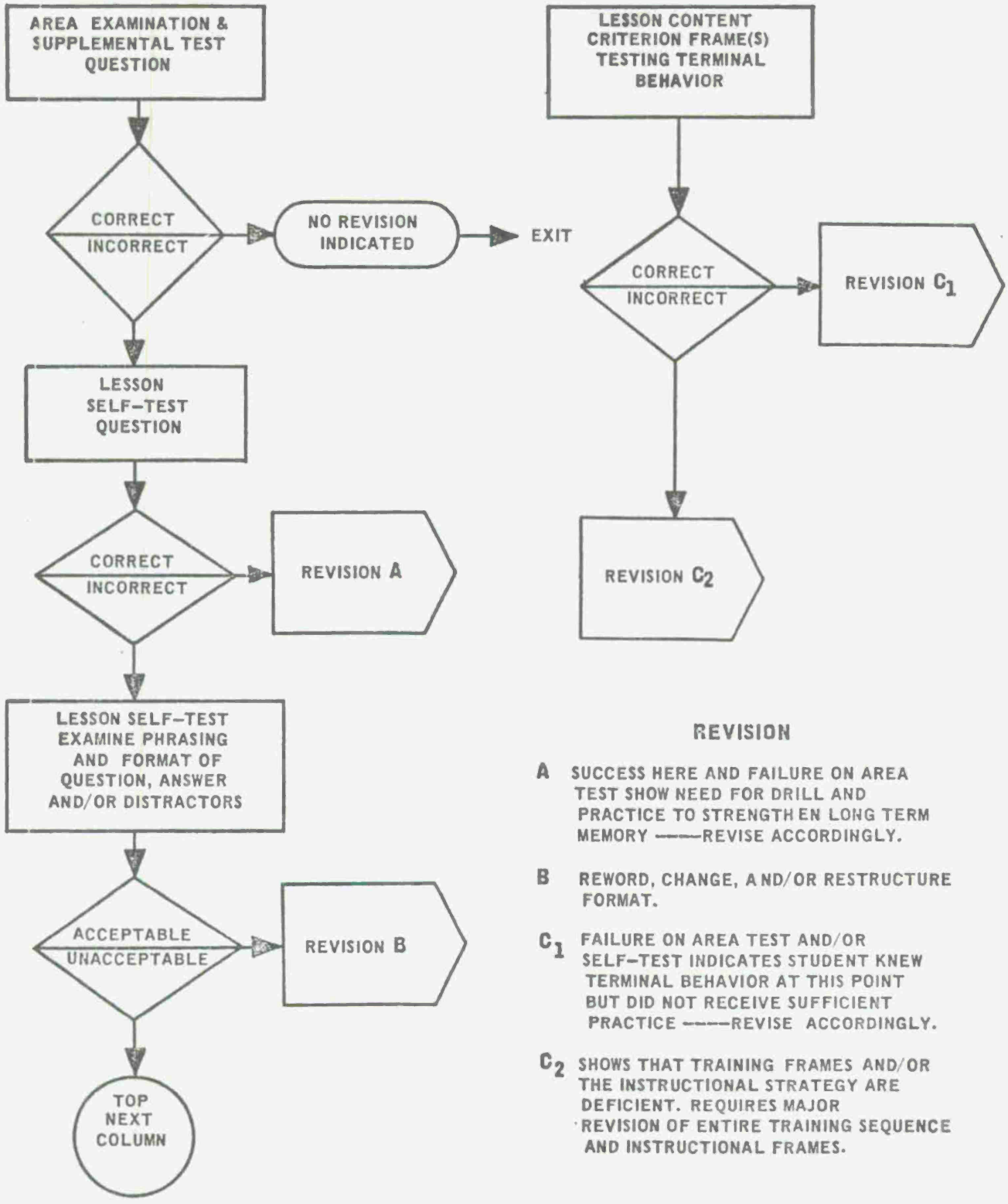

Figure 2. Flow Chart of Sources of Data and Types of Revisions Indicated

laboratory supervisors, student performance evaluation specialists, course evaluators, computer applications programmers, and subject matter experts.

Instructional support roles of both types will become more highly specialized. At the higher skill levels it is doubtful if adequate numbers of skilled personnel can be maintained if the current duty rotation rates are maintained. This will present problems both to the personnel assignment system and the instructor training system.

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IMPLICATIONS OF INDIVIDUALIZING INSTRUCTION FOR DEFINING INSTRUCTOR AND INSTRUCTIONAL SUPPORT ROLES

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As evidenced by the many references to self-pacing and individualized instruction occurring in literature and conferences about military and industrial training, it is apparent that individualization can be considered to be a central concept around which to develop projections and plans related to instructional support roles of instructors and other training personnel.

There are many definitions of individualized instruction. These definitions have in common the central concept of interactions or interdependencies among material to be learned, method of teaching or presentation, and characteristics of the learner; e.g., aptitudes, past learning (apperceptive mass), attitudes, interests, motivation, personality, readiness, maturation, and perhaps various genetic, biological, and physiological dimensions. In terms of this general definition one could defend the argument that individualized instruction has been around for a long time.

As a thesis for this discussion I would like to propose that in one way or another instruction has always been individualized to some degree although our strategies and our perceptions of the learning process may have often been more obviating than facilitating with respect to obtaining certain goals.

The Socratic Method, Apprentice Training, Remediation Programs, Systems of Therapy (a la Shoben), and much OJT are forms of individualized instruction. So also are the myriad forms of informal parent-child training relationships and even in a loose sense the whole vast antisystem referred to as learning by experience. The difference between many of these examples and some of our more modern systems of individualized instruction is the prescriptiveness of procedure, the explicitness of goals, and the extent of systematic planning for developing and using science and technology in developing instructional materials and delivery systems.

I would like to suggest that individualization of instruction can be conceived as a continuum stretching from one extreme where a unique set of relations is established or assumed between one individual and a set of methods and content to another extreme in which we have lock step instruc-

tion across some generally prescribed content and some bounded group or set of individuals. Typically, some concept of homogeneity is basic to both the content to be learned and the group for which learning is intended. Another way to say this is to say that we typically subdivide the universe of content into subject matter, topic, or skill areas. We subdivide the universe of learners by such characteristics as age, sex, I.Q., specific aptitude or some other convenient and, hopefully, meaningful dimension, and we subdivide method into some general set of categories such as lecture, demonstration, and practice.

For this conference we might also conceive of dividing instructional delivery systems in terms of the extent to which they are instructor dependent or instructor free if the instructor role is thought of as direct transmission of content to be learned to the learner or learners.

Ideally, individualization involves optimizing interactions among content, method and characteristics of the individual in ways which will maximize rate of learning, mastery of content, resistance to forgetting, and generalization or transfer. We are just beginning to learn how to accomplish such optimization and prospects for the next decade are challenging and encouraging.

If one takes seriously the ideal concept of individualization, severe problems could arise over the question of who controls the destinies of learners. Institutions vary widely with respect to their views on this question. For very practical reasons, controls are usually highly institutionalized and are typically exercised by almost anyone except the learner. The issue here, if there is one, is the degree of choice allowed the learner with respect to content, method or both and the degree to which instructors are, directly, the agents for transmission of learning content to students.

From an institutional point of view one of the first and most pragmatic decisions to be made involves defining the bounds of individualization. With respect to content, bounds are usually set in terms of goals and characteristics of both organizations (including societies and their representatives) and individuals.

With respect to method, bounds may be set in terms of fiscal constraint, tradition, technological state-of-the-art, strategies, and competencies of teachers and other managers and developers of the instructional process.

With respect to the characteristics of the learner, bounds may be set in terms of age, special problems, diagnostic techniques and scientifically demonstrated relations between characteristics, methods and content, or fairly often sheer beliefs of even superstitions about relations between individual characteristics and content or method.

With this view of individualized instruction it should become clear that many options are open. Under certain conditions designers of instruc-

tion could properly decide on appropriate degrees of individualization. The extent to which instructors would directly or indirectly transmit information or skill-building requirements to students and the extent to which any, many, or no complex delivery systems would be employed in instruction would be open to decision based upon cost, efficiency and effectiveness of differential designs for different objectives and different kinds of students.

It is my belief that during the past 20 years we have broken with a long tradition. We are moving from instructor centered to student centered instruction. We have gone from learning theory to instructional theory, from rudimentary AV instruction to technology of instruction, from an impoverished to a rich educational psychology, and from a meager to vast and sometimes unmanageable technology of training.

The wide management of this technology, the facilitation and direction of its growth and the judicious choice of options it offers are a responsibility shared by all of us attending this conference. This shared responsibility, in my opinion, carries major implications for decisions that impact directly on the roles of research and development and the roles of instructors and other instructional support personnel in pursuit of the common goals of planning, designing, developing and executing instructional delivery systems of the future.

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THE INSTRUCTOR 1975-2000: A CHANGING ROLE?

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My task in this paper is to project the trends in instructional technology and interpret the future state-of-the-art in terms of the probable changes in the role of the instructor through the year 2000.

I tried to be boldly speculative and provocative within the bounds of plausibility. I have oversimplified at times in order to highlight a point and I have been irreverently critical at times. However, on the basis of what I have heard in the preceding papers I fear that my projections are timid and close to realization rather than bold and speculative. Each speaker has made one or more points that I thought were among my more radical projections. Therefore, I have changed my objective to providing a summary and integration while still taking a longer range perspective in projecting development. I interpret the consensus among speakers as validating my perceptions of the trends in instructional technology.

I adopted two working rules. The first rule was to use my own intuitive integration of what I have been reading, discussing and thinking to provide an overall picture of trends. This approach is in contrast to the conventional scholarship of presenting only what can be well documented or shown to be logically necessary. The second rule was to avoid paraphrasing one of the many tomes and articles on the "computerized," "high technology" world of the future. This presentation can be described aptly as one person's "raw-feel" hypotheses. No distinction is made between education and training for present purposes. They may differ in several ways, such as content, training objectives and relative emphasis on skill, conceptual and verbal learning. However, the tasks of the instructor, teaching methodology, and learning process are fundamentally the same and no useful distinction can be drawn. Training, including military training, is subject to the same technological and cultural traditions as in education. Consequently, I treat them generically through the paper.

I have been impressed by what is being done in the application of instructional technology, as represented by the programs described at this conference. However, I am much more pessimistic when I view the entire educational establishment in terms of the utilization of instructional technology. There are occasional programs that are impressive: the ones described here and some university-level learning centers. However, they are actually developmental projects which are prototypes or demonstrations, usually limited in scope. They are exceptions to the general condition and

the pioneering work of a few enlightened people. Even these projects are 10-20 years late in relation to the presence of an available technology.

Across the educational system there is little or no effective use of audio-visual techniques, individualized instruction, programmed instruction, or computer-based training. In many instances there is a lot of lip service and jargon with no substance. The term "Learning Center" is usually salesmanshipese for classroom building rather than a source of innovative instructional methods. Thus, we have a long way to go during the next 25 years to accomplish any changes in the educational system which will have an impact on the instructor's role.

In responding to the question, "Will there be a change in the instructor's role?", I have organized my remarks into the following six topics;

1. Argument for "No"
2. Argument for "Yes"
3. Conditions Necessary for Technological Change
4. Need for Methodological Change in Education and Training
5. What Might Happen
6. Do I Believe It.

The argument for "no" is easier to accept because the existing conditions reflect a stable accommodation of existing needs and forces. This accommodation tends to be self-preserving. Belief in change must presume the emergence of factors that upset the stability and force change and reaccommodation. Thus, the conditions necessary for change become a critical consideration.

The Argument for "No"

The argument for "no" is based on the following considerations: minimal change to date, popularity of the Socratic Ideal, failure to use technical advances, failure to respond to social need, and batch processing of students.

Minimal change is reflected in the prevalence of the lecture as the dominant instructional method, although we know it is pedagogically ineffective and there are better methods. The lecture at best is a one-way relationship with minimal feedback. The student is a passive auditor; there is no adequate way to assess the learning that occurs during the process of lecturing. It is an authoritarian structure with the student in a passive, subservient relationship to the instructor. There is a lack of student autonomy and responsibility for management and control of his own learning. Of course, in contradiction, we do ultimately hold the student responsible for his failure to learn as a personal deficiency.

The time has long passed for getting the instructor out of the front of the classroom and giving the student autonomy and responsibility for his own learning activity. Teachers do not teach; they set up conditions so that students can learn and provide resources to support learning. The

conditions of the lecture method interfere with learning. Yet we cling to it as the sovereign remedy for lack of knowledge.

What I call the Socratic Ideal has dominated the thinking of the American educational community. The essence of the ideal is the wise, knowledgeable teacher who enters a question and answer dialogue with the student. The student-teacher ratio is one-to-one, or few-to-one at worst. Generally, the teacher asks and the student answers. The teacher's questions are incisive and his logic is flawless. The dialogue is the student's stimulus to learn. Supposedly, the Socratic dialogue is the optimal learning technique. The sarcasm in this statement makes any evaluative statement unnecessary.

We have no evidence that the Socratic method is an effective or superior technique for any kind of learning. It seems reasonable to expect that the method would produce an increased active role for the student and a shared initiative between instructor and student. Still, we have no evidence to support these conjectures. Its major difference from the lecture is the availability of a feedback loop during the instructional process. The nature of the technique is not delineated and its use is highly dependent on the unique art of giften practitioners.

A wholistic, unquestioning approach to the Socratic method and its preference as the alternative to the lecture have impeded the adoption of other instructional techniques. There is no indication that teachers are modifying or abandoning their prejudice in favor of the method. Unfortunately, it antedates Aristotle and utilizes little of the knowledge about the learning process and educational technology generated during the past 50 years.

Another factor in the argument for "no" is the failure to use technical advances, such as:

1. Audio-visual media
2. Programmed texts and teaching machines
3. The printing press
4. Simulation and practical experience.

Few teachers use graphics, visuals or film and seldom are they an integral part of a presentation. Budgets seldom allow for expenditures for audio-visual materials. At best they are regarded as luxuries or frills rather than the tools of instruction. Educational television is a picture of a lecturer talking in front of a chalkboard.

We even do not recognize the invention of the printing press. At least, we insist on dictating a book to the student in class. We give him a textbook to read but we generally point out that is is less adequate than the one we dictate.

Simulation and practical experience are seldom used. Verbal and conceptual content are esteemed as more worthy than practical experience, whether through simulation or OJT. Concurrently, simulation techniques have

been inadequate; they have more glamor than training effectiveness. OJT has been unplanned, unsystematic and executed by supervisors with little training skill. I offer the following sarcastic definition of OJT as a reflection of these conditions: "A man who has had one year of experience repeated five-to-ten times transmits a meager store of irrelevant, false and inconsistent information to a junior person who pays for this tutoring by performing menial chores and ritual acts of adulation."

We have also failed to respond to social need in terms of productivity or demonstrable effectiveness. We have not established criteria of productivity on which a consensus has been reached even within our own professional groups nor do we have evidence that the educational enterprise meets any criterion. Cost-effectiveness is a popular term but it has not yet been conceptualized adequately to permit implementation even for qualitative evaluation. Finally, there is a marked absence of empirical validation of any educational procedure or experience. We simply do not have sufficient "hard data" to support a position that education is effective and responsive to society's needs.

The final argument for the "no" answer is the batch processing of students. Contrary to our public oratory we ignore individual differences among students and treat them all in some variation of "lock-step" relying predominantly on the single method of lecture. Similarly, we ignore differences between tasks and training objectives. Batch processing works for the instructor because he can attribute failure to the student. Each student was treated alike and had an equal opportunity to learn; the superior succeed and the inferior fail.

I must have a reason for this extended diatribe on the educational system. My ultimate point has two parts. First, a strong, plausible case can be made that the system is bad. Second, the durability of a bad system must mean that it has something working in its favor that ensures its continued survival with minimal change. I may have drawn a gross caricature but let us accept it as the strong case for "no".

The Argument for "Yes"

The argument for "yes" is based on the postulation or perception of factors that will overturn the existing stability. It is based on the following considerations:

1. Present training is inadequate
2. Need to maximize use of resources
3. Maturing technology available
4. Increased accountability
5. Growing sophistication of the research and development community.

The inadequacy of present training can be identified in terms of low production, rate of graduates, low quality, excessive attrition, excessive expense and time-consuming methods. In addition, there is misuse of human

abilities. If one looks at a list of activities that the computer and man do well, the tasks assigned to man in a training system are tasks at which he is especially poor. He is a purveyor of information and a monitor of a process. These activities are algorithmic and repetitious. Certainly the instructor must be a person who cannot be bored and does not waver in attention with repetition. I have long been puzzled by an acquaintance who taught freshman algebra every year for 20 years. Surely, his interest and his proficiency had to wane; surely, his functions could have been mechanized and a better use made of his abilities.

Another argument for "yes" is the growing need to maximize the use of resources. Budgets are tending to stay fixed in amount, especially in military organizations, and it is difficult to keep up with inflationary increases. At the same time the requirements for training are increasing. Training pipelines have been getting longer in duration. Man-machine systems are becoming increasingly complex in both operational capability and engineering design. This complexity is in turn forcing an increase in the length of training and required levels of proficiency. My colleagues and I have recently begun to explore the relationship between system complexity and training time. Engineering estimates are a three-fold increase in complexity from 1950-1974; there has been a six-to-ten-fold increase in training time. Engineering estimates for the period 1975-1980 are a ten-fold increase in complexity resulting from the use of digital techniques and integrated circuits; the corresponding increase in training requirements may be greatly accelerated.

There is also a maturing technology available which may stimulate change. The research and development activities of the training, human factors and computer technologists are coalescing into both a technological base and designs for training systems. The related technological areas include data processing, instructional methods, simulation techniques, individualization of training and training analyses.

The two final arguments for change are increased accountability and increased sophistication of the research and development community. Cost accounting is permeating the world as a management tool; there is a corresponding requirement that those who spend money must justify the need and the merits of their expenditures. We will ultimately have to provide evidence of training effectiveness. Also, personnel in the research and development community are becoming increasingly sophisticated about personnel requirements and training technology. They are correspondingly expecting answers to tough, poignant questions as prerequisites for their budgetary support.

These considerations point to a need for change in education and training. Although pressures to change exist, the moot question is whether they are sufficiently strong and persistent to overturn the stability of the current system. I do not know of a quantitative technique that enables me to give a precise answer to that question. My professional interest pushes me to conclude that there will be a change but I always regard

wishful thinking with suspicion.

Pressures Opposing Change

There are several factors that work to oppose change. One factor is that there have been no appreciable negative consequences of not changing. There has been no apparent loss to the training establishment whether measured by financial support for training, personnel or status. There may have been losses or costs to the operational world as a consequence of less-than-desired proficiency of graduates but no apparent loss to the training establishment. Actually, an acceptable bad situation tends to ensure support because of the practice of curing problems by applying money to them. When the problem goes away, one has applied enough money.

Another factor is a set of conflicting traditions arising from historical trends in education and training. I have identified three trends: professionalism, social competence and enrichment and, lastly, individual growth. Professionalism is the oldest tradition in modern education. Its principal characteristics are an emphasis on specific tasks within a scope limited to job-related activities, technical excellence and career orientation. Its origins were in training for the professions of law, medicine and theology. Technical and vocational training which emphasize job relevance fall in this category.

Social competence and enrichment have an emphasis on general education. Possibly having its origins in the education of a social elite, the emphasis became social status and advancement as education expanded to include the broader segment of the population. A major objective of education then becomes the creation of an elite in-group.

Individual growth is a trend that has emerged strongly during the last quarter century. Its emphasis is on maximizing the development of individual talents. Personal enrichment with secondary regard for utility is the main objective. At the same time there is concern with role functions such as education for citizenship.

Vascillation among these three historical trends opposes any consistent momentum for change. The trends have non-overlapping sets of goals and are incompatible if education is evaluated by a single criterion such as transfer of training to a job situation. One must make an explicit decision on the relative emphasis of these trends in a program. I suggest that even in military technical training we have this mixture of objectives.

The most significant factor opposing change is that the personal needs of instructors are being met within the present system. The principal personal needs can be classified as power, technical achievement and affiliation. Technical achievement and knowledge are also the path by which an instructor currently receives recognition from his peers and superiors. These needs can be satisfied by behaviors which are not learning-related or are even inimical to learning.

There are other needs. For example, don't increase the workload by adopting changes that increase preparation time or require becoming familiar with new training developments. There is also the old wisdom of "don't rock the boat" by proposing new or different ideas; they make both superiors and peers uncomfortable.

Similarly, the personal needs of the students are being met by the present system. Through adaptation and selection most students are comfortable and the number of gross misfits are few.

Finally, there is evidence from social psychology that leaders must be representative of the groups they lead. Conformance to values, traits or ideas important to the group is critical to acceptance and status of the leader. This conformity has a powerful conservative influence which resists change. The leaders of the educational establishment will function to support the traditional ways rather than innovation.

Conditions Necessary for Technological Change

Given this pessimistic outlook, is there any basis for expecting change? There are three conditions necessary for technological change:

1. A radical change in requirements
2. Impossibility of "patching" or modifying old methods to fit the changed requirements
3. Necessity of meeting the requirements.

Change in education then is dependent on whether these conditions are satisfied. It appears that there is a radical change in requirements; at least the impending growth of training requirements is approaching a critical situation. Conventional methods are not efficient or effective enought to meet the need without excessive expenditures. Of course, the "cure by applying money" philosophy may lead to at least an attempt to use conventional methods. Necessity of meeting the requirement may or may not exist. One recurrent theme in system design is the elimination of man on the grounds that he is unreliable and difficult to train. While the situation is deteriorating, it is not clear-cut that the current training system yet satisfies the conditions necessary for change.

What Might Happen

Assuming that there will be change and instructional technology is widely adopted, we can project the nature of the instructional changes and the redefined role of the instructor. The changes can be summarized in the following categories:

1. Computer-based instruction will be commonplace
2. There will be an instructional technology that is sophisticated and powerful
3. The instructor will be highly qualified in both behavioral methods

and subject matter
4. The instructor will be a manager of an information system
5. Personal need structure will change
6. There will be a career ladder for instructional personnel.

Computer-based instruction will be done in multi-station trainers run by distributed systems of mini-computers and microprocessor. Student/teacher ratios are inadequate measures of capacity for computer-based systems because the tutorial relationship of student and computer greatly increases capacity. However, I hypothesize that student/teacher ratios will vary from 4/1 to 10/1, depending on the amount of individual contact required and the workload of system operation and record keeping. Student station/computer ratios will vary from 10/1 to 50/1, depending on the number of different topics being taught simultaneously and the amount of "hands-on" simulation being used.

Computer-based trainers will make extensive use of simulated equipment designed specifically for training. The level of fidelity of simulation will be determined by what is needed to achieve the behavioral objectives and may vary between types of objectives. "Hands-on" experience will be used extensively for skill learning and application of knowledge; it will be incorporated with the acquisition of verbal and conceptual knowledge. In addition, generic training ror classes of systems will be used to produce high positive transfer of training to specific operational environments.

A sophisticated and powerful instructional technology will exist to meet the objectives of individualization of training and career-orientation. The technology is built around the concept of instructional strategy consisting of:

1. A battery of validated instructional methods
2. A range of validated audio-visual, multi-media techniques
3. Reliable and valid techniques of measurement, diagnostic of training difficulties, performance measurement and ability assessment
4. Predictive models of student performance
5. Variation in use of fidelity of simulation to meet training objective and criterion.

Training requirements will be defined by transfer of training to the next course segment or assignment.

The instructor will be qualified in both behavioral methods and subject matter; his training will be an interdisciplinary program including mainly educational psychology, computer technology and a technical specialty. A qualified instructor will:

1. Know instructional methods by strengths and weakness.
2. Know interactions of instructional methods with task, behavioral objective, and student aptitude.
3. Be skillful at one-to-one interactions in diagnosis of student

learning difficulty, remedial subject matter techniques, and adapting training to the student's needs.
4. Know psychometrics of performance measurement and evaluation.
5. Understand relevant computer technology and have facility in using authoring computer languages.

These changes require that the instructor's role change to one of a manager of an information system. In this role he will utilize multiple resources, monitor student progress, provide tutorial assistance, evaluate student performance records and deal with the personnel system in career management of students. In this capacity his major tasks will be significantly modified; the level and kind of interaction with the student will also change.

Similary, the personal needs which can be satisfied in the instructional situation will be quite different. The personal need structure will be compatible with joint technical-instructional competence, less direct satisfaction of power needs, satisfaction from a two-way interaction of student and teacher, orientation to facilitating student growth and promoting an active role for student.

Finally, I think there will be a career ladder for instructional personnel. The following job titles are offered as a hypothetical career ladder in increasing order: Audio-Visual Aide, Teaching Assistant, Junior Instructor, Support Technician, Media Specialists, Senior Instructor, Course Manager, and Program Manager.

Do I Believe It

I think so! My "no" argument is perhaps stronger. However, I have a strong intuition that these seeds of change are here and they are being nurtured by current financial pressures and the educational research of the past 25 years. Further, the role and relative magnitude of training in the armed forces has changed considerably since World War II so that new ways may well be necessary.

Certainly all that I have outlined is within the state-of-the-art. We have some applied research to do to fashion solutions for specific applications. However, we know how to do many things and the principal task is tidying up and organizing our knowledge. I do not want to imply inadvertently that there is no further basic research needed on the learning process and instructional methods. Rather, we can make significant improvements in training systems by using the knowledge we already have.

A significant problem in developing such applications is finding suitable personnel. We seem to have two separate kinds of people: the researchers and the practical people. The researchers, like me, tend to be impractical and pursue an idea for its own sake but more often they have the breadth of view and knowledge to plan and implement bold schemes. The practical people are very good at getting specific jobs done but they are less likely to have the scope to perceive and execute the total program. The

researcher wanders off in his thoughts and the practical man gets lost in his own actions. We need to be aware that we need both types in a complementary relationship. The need exists. Money is available. The investment of large sums of money will require redirection of funds from current programs. Redirection requires a change in priority and the change is dependent on the relative perceived impact of the need for a change in training.

There are two critical issues on which the outcome depends. First, is there a champion who provides the motive, direction and persistence to implement a program? Second, will the establishment change in response to the pressures?

A PERSPECTIVE, SOME DIMENSIONS, AND CONCERNS FOR NAVY INSTRUCTORS OF THE FINAL QUARTER OF THE TWENTIETH CENTURY

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Nearly two decades ago, a few scientists of the California Institute of Technology added some shocking facts together with some bold assumptions and produced a bewildering series of projections for the future. Topics they covered, in the main, included population, food productivity, energy, and brainpower. Their concepts and projections were published in a book entitled The Next Hundred Years, by Brown, Bonner, and Weir (1963). Critically acclaimed, the work is still a chillingly refreshing look into tomorrow. It is also filled with series after series of alarming statements. The charts included - many of them - are horrifying in that the data displayed often projects along a time continuum isometrically when dealing with world population growth, energy consumption, fossil fuel extraction, and the like. There is some dating, of course, of the authors' work. Certain medical, other scientific, and political events, unforeseen at the time of publication, have altered bits here and there. The cost of coal, used for cost ratio establishment, is listed as $6.00 per ton, for instance, as I assume it was in the early 1960's. Some of us know that coal is now in the $30.00 per ton range; at least, that is what the Tennessee Valley Authority had to pay for it in a recent contract to supply that Authority's daily consumption of close to 90,000 tons, and the population numbers are off a bit. The authors projected a U. S. population figure of 225 million in 1975 and suggested that "... it may well be over 300 million by the end of the century." (Brown, et al., 1963). The population at the moment is approximately 213 million. If all we had to consider was the present replacement rate for human beings, we would now be in a state of population decline, but considering the living and capable-of-reproduction numbers, a large portion of which are the product of the World War II-era "baby boom", that decline is not likely to start until about the year 2000. At that time our population will be approximately 264 million. But the conditions have been set into motion at this time to bring a cessation of population growth of these United States (Fishburne, 1975). Once the decline starts, the projection has been made, that two decades into the twenty-first century will see a total population of the United States of about 185 million (Gilliland, 1975).

This point was made not to bring discredit upon the fine scientists cited, merely to remind all of us that sometimes the conditions or the descriptions of the moment occasionally have a way of leading us astray. Consider the immense problems we have with oil today and the power shift that it has caused within the past year. Who had the foresight to make the

prediction two years ago that, within a year, the Federal Government would have had engraved literally millions of certificates to be used in gasoline rationing? And who would have ventured a guess at the expanse of change in the state of the Nation's Executive Office within that same period? Are there many of us who expected the widespread employment of the integrated circuit to the extent that sophisticated calculators would be hanging at the hips of so many of our high school students today? (Do you recall the number of school systems which returned to the McGuffy Reader only a decade ago?)

The Next Hundred Years, in spite of the fact that some of its concepts are not holding together very well is, nonetheless, a disturbingly fascinating document. The section on food production is a scholarly treatment of the ability of the earth to provide the population inhabiting it with enough nourishment. A world population of 7 billion seems to be pushing into the absolute limits area for Mother Earth. From what I am able to put together, by the year 2000, the population totals for China and India alone will be three and two billion respectively. Just these two countries will contain, at the turn of the next century, more than twice the population of the earth at the present moment. Yet, there are a great number of other "developing" nations with similar birthrates (but with smaller base numbers, of course). So, population in general is a major consideration for us in the immediate and near future.

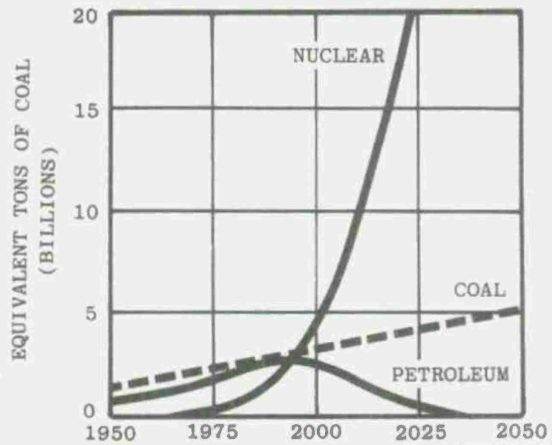
Energy, and the ability to be able to produce continually larger amounts of it, has become a considerable problem of staggering import even now. We have seen the retail price of gasoline nearly doubled within the past two years, and the end of natural gas recovery by convenient means is just around the corner. We have seen huge passenger airplanes, virtually just delivered by the manufacturer, removed from service and, in low humidity environs, silently awaiting agonizing corporate decisions. The thirty-some dollar-per-ton price tag on coal has resulted in my being "allotted" 20% less electrical power (from a comparable period of last year) to consume this winter. Yet, was it not even less than two years ago that most electrical companies were paying a bonus (or a bounty) for installing high-use electrical units such as fast-recovery water heaters?

The modern-day processes used in the recovery of coal have outraged many of us, but that outrage may have to be held in check for a while - particularly if we need to embark once again on coal gas (rather than natural gas) usage.

Nuclear power has been a disappointment. Perhaps I expected too much too soon. And now I am worried about the supply of available radioactive mineral resources. People who should know (one is a high official of our Oak Ridge laboratory), say that all of our energy problems will be solved within the next three to four decades. With the virtually limitless sources of energy available, it will be possible to extract significant quantities of uranium and thorium from rocks commonly found in the earth's crust, thus, it will be possible to provide vast quantities of energy for the industrial

world's needs (Brown, et al., 1963). Of course, enormous amounts of energy apparently are needed to extract such minerals but, since the energy problems will presumably be solved within the next several decades, that should present no problem. When, however, we run out of rocks....

Looking now into the brainpower resource and its effective employment within this time period, we have other dimensions to consider. Obviously, it is going to require a great deal of brainpower to solve the energy problem, and the same goes for finding solutions to the food problems as well. Feeding seven billion people is going to be no easy matter; consider the problems we have today trying to feed 2.5 billion. The individualized nations are going to have to increase the productivity of this resource, brainpower, in order to help the earth's people to overcome problems created by themselves - be they the waste by frivolous use of electricity, or the heart-sickeningly frivolous over-production of children. The figure[1] shows, for instance, the heart of the problem here. It graphs expected world energy consumption into the next century; notice in particular the world requirements for such production being in the nuclear domain.



PROJECTED ENERGY CONSUMPTION

A projection for energy usage in the seven billion world population era has been identified as requiring the equivalent of 70.0 billion metric tons of coal (Brown, et al., 1963). This is an intriguing problem, only a few decades hence. To meet this demand, massive amounts of brainpower will be needed. And, in the face of this impending crisis, it is a curious thing to me that so much emphasis within our educational systems today is placed on dealing with fads, notions, and folklore. The approaches taken seem to be attendant to either yesterday's or, at best, this morning's problems in the schools and society. We overwhelm ourselves with drugs, worry about "new" movements and do not quite know how to utilize

[1]Source material for this figure was extracted from a variety of sources, mainly Brown, Boner, and Weir, (1963).

the very precious resources made available through acts of Congress, much less good public faith, to help us through this difficult period and to plan for the future. Take, for example, the table of contents for the recent volume of The Shape of Education, published by the National School Public Relations Association (Editors of Education U.S.A., 1970). It reads:

> Schools Without Walls: No Longer a Dream
> Drug Crisis Challenges Schools
> Reading Crusade: An End to Illiteracy?
> Accountability: The New "In" Word
> Catholic Schools Face Crisis
> Differentiated Staffing Stirs Debate
> The $$ Challenge: Time for Reform?
> Are Courts Running the Schools?
> Sensitivity Training: What's That?
> TV Comes of Age in Classroom
> Environmental Education: A New "Must"
> New Brand of Activist: The Student Volunteer

The goal of this handbook, incidentally, is"... to pinpoint key issues in concise, understandable language; to give busy educators an authoritative, up-to-date report on what's new in education in one book; and to provide the education profession with a handy, reliable source book for speech and news writers." (Editors of Education U.S.A., 1970).

A recent issue of the APA Monitor discussed some of the trauma that the National Institute for Education has undergone during the past few months. This agency went virtually from zero funding to $70.0 million, the former figure for a variety of reasons and the latter figure resulting largely from the concerted efforts of National organizations serving professionals in education and related behavioral sciences. One severe criticism noted was that teachers, once being provided grants, really did not know how to carry through the intended (and funded) efforts. Think of this: They had the time, the financial resources and, most importantly, the students to work with -- but they did not know how to or elected not to make effective use of the resources. In the January 1975 edition of the APA Monitor, departing NIE director Thomas Glennan, indicated that a major problem was that expectations were not realistic and that innovations have been foisted off on the public in the name of research, and many have failed in practice. This has led to degradation in public confidence in their institutions. He is described as feeling that self-serving teachers and administrators have conducted irrelevant research projects in the classrooms, giving students and teachers back nothing of value in return. With stories such as this, it is small wonder that NIE had problems to the extent that the 70 million dollars provided are merely carryover, holding, continuance types of funds. But the waste of brainpower with so little time left in which to act is deplorable to the extreme. Let us hope that the doom-seers are wrong; that, as MacBeth was with his misinterpretation of the witches' prophesy, we are likewise guilty of misinterpretation of

the futurist's views of the world we know. But let us hope that the misinterpretation is correct.

Thus far, we have looked ahead some few decades and probed into what are apparently meaningful facts for consideration at that time involving four issues: population, nourishment, energy, and brainpower. We might have looked at others; indeed, we will have to in the coming years, and do it with effectiveness and efficiency. Such others might include organizational structures, roles of governments, the ingestion of the female into societal status of equality, environmental control, human values, and the like. The literature offers a wealth of information on any and all of these, tying into perspective what you will--educational institutions, technological needs, religious implications, and the like. It is worthwhile here to consider what a gaze into the future really entails. The word is "futurism."

Futurism is not really in the best guess category; it embodies scientific approaches to the quantification of subject matter following certain changes. It is, in fact, a research technique employed by numerous persons and organizations. The advocates have a well-informed intellectual base from which they draw upon and there seems to be a well organized movement involving the science.

Methodologies have been developed, journals are devoted to the science and greater attention is devoted to learned accounts or forecasts than ever before. (Recall, if you will, the shocking effect the dazzling study of the future the Club of Rome issued a few years ago.) Generally, it can be said that futurism"...has a strong negative purpose: namely, to anticipate unfortunate developments so that they might be averted." (Oxenfeldt, 1973.) It embodies a near-philosophical hypothesis that, while unpredictable the future may be planned for so carefully that it may be achieved. Given careful consideration of trends, resources, aspirations, and the like, the futurist can describe conditions that will exist some years hence should little or no intervention take place.

> Modern futurism emerged at a time when man commanded the resources to mold his future, so that he need not passively accept and adapt to it. The rapid growth of futurism reflects the confidence of intellectuals that careful analysis of developments as they emerge, objective assessment of their effects and imaginative efforts to capitalize on their benefits and to avoid their evil makes possible a future that is enormously better than the present and past. They clearly fear that without such efforts the future could easily be intolerable. (Oxenfeldt, p. 2, 1973.)

The difference between forecasters of the future and futurists seems to be in the degree of sensitivity each has to some sort of index of validity for the predictions. Forecasters hold back until there is some degree of certainty that the forecast is likely to occur and futurists have more interest in bringing issues forth so that they can be considered in some

understanding way in order to take necessary actions concerning their impact. I do not think that the differences, for purposes of this paper, are of significance. They are brought out to emphasize that the persons usually involved in describing the future are usually serious scholars and are a force worthy of audience. And there are numerous people of this sort to listen to, including Alvin Toffler, Peter Drucker, and Ray Bradbury.

Carl Rogers, in a paper prepared as part of a symposium entitled "U.S.A. 2000" was careful to make the point that man, with technology and power to direct the future is"... endeavoring to choose his future rather than simply living out some inevitable trend (Jun and Storm, 1973). Rogers, predictably, cautions that the greatest problem man faces for the future involves the question of how much he "... can accept, absorb, and assimilate, and the rate at which he can take it." (Jun and Storm, p. 112, 1973,) To Rogers, the world population and the necessity to live in close relationships with others will foster rather different relationships than we have at present. Roles of the parent, partner, religion, and work will assume different proportions and the encroachments into the personal life of the individual, the forced itimacy will encourage, may well bring about serious problems of human adaptability.

Not too long ago, the Navy invested some research and development resources into a look at the 1970's. A multi-volumed result was produced by Westinghouse, and titled Potential Impacts of Cultural Changes on the Navy in the 1970's. Areas covered include those of philosophical, international, technological, bio-medical, social and cultural, and organizational. National goals, domestic institutions, the military relationships, armed conflict, and old and new directions were also treated. While the study deals largely with potential impacts which are highly focused upon the 1970's, the philosophy of the study and that of the armed forces in general are well ingrained. An obvious influence upon the central interest of the study is made by reference to a statement attributed to Lawrence I. Rodway.

> Armed forces leaders have always required two sets of virtues. One consists of skills and attitudes useful in battle, the other skills and attitudes useful in coping with the larger social and technological environment.
>
> Constant leadership requires an ability to inspire a special category of men under special conditions....if few will ever hear a shot in anger, all must be taught to persevere in the face of confusion and danger...and all human beings must be trained to overcome egoism and fear; it does not come naturally. Hence adamant insistence on loyalty, unity, courage, obedience, hardiness, and zeal. In no man are such qualities much enhanced by long study or reasoned argument, least of all in the underclasses who loom so large in combat outfits. They are enhanced instead by discipline, by symbol, and above all by personal example (Westinghouse, Vol 1, p. 15, 1972).

Now we come to the point of the previous discussions on futurism, projections, national education, orientations, and the like. The potential impacts Westinghouse listed are numerous and exhaustive. And the volumes are filled with conditions, factual statements and logical trains of thought. The impact statements are thoughtful reflections of the conditions presented. After review of many of the potential impact statements and a somewhat lesser number of the conditions, I have the feeling, however, that too conservative an approach has been taken. The statements - many of them - are simply not positive enough to satisfy me. For example, words such as possible, may, might, and the like are used all too frequently. There is a strong lacking of positive statements and consequently, the projections lack the strengths that most futurists seek. True, they are called potential impacts, but the potentiality of cultural changes as they impact on the Navy would seem to me to be a more useful tool for planning. A dedicated series of forces resulting from cultural changes, to be used to direct the future would be nice for the Navy to have about -- especially now. Here are a selected few of the potential impacts contained in the Westinghouse effort. They represent my best choices per section:

Section	Potential Impact
Philosophical	2. As an authority-oriented institution, the military could be adversely affected by the declining legitimacy of authority in American society and society's prospective declining interest in socializing its youth into at least some acceptances of the need for authority, in a balanced relationship of rights and obligations.
International	1. Many trends point to at least substantial continuing American international responsibilities, and hence, Navy missions. The spectre of limited resource availability, however, will enforce new evaluations and perspectives of national mission and capabilities. One possible contingency is the end of the ever-upward spiral, which would generate radical revision of strategic concepts--possibly of the nation-state system itself. A lesser contingency, selective drying up of some resources but not others, would probably heighten international competition and tensions.
Technological	1. As one of the most technology-oriented institutions of society, the Navy will be heavily challenged by the increasing complexity technology generates.

Section	Potential Impact
Bio-Medical	12. Substantial changes in the ratio of women to men in society will revise woman's roles in society, including the military establishment.
Social and Cultural	9. A national health care system may replace all military medical services, except those at sea, at remote bases, and in land combat areas.
	121. To some degree, youth is what we have made it, and if we desire it to be different, we cannot remain aloof from its problems and prospects.
Organizations	12. Increasing education will produce more competent people for the Navy, but will also produce more independence-oriented people.
National Orientations	1. The Navy's institutional values will adjust to changes in the prevailing values of American society. At the same time, some American values will remain relatively stable, as will related values of the Navy.
Domestic Institutions	20. The development of more clearly defined apprentice levels in technical fields may facilitate lateral entry procedures into the Navy in certain ratings.
The Continuing Military Context	2. The nature of enlisted service in peacetime may come to resemble the contractual nature of civilian employment, with less implication on "obligation."
Vietnam and Other Impacts	1. The traditional military response to widespread public criticism, including irrational criticism, is to lapse into silence. The proliferation of media groups may render such a course less viable in the future.
Old and New Directions	2. Future competition for competent manpower may press the Navy to more vigorous exploitation of areas of the total national manpower pool previously neglected, viz., women, younger adolescents, and the handicapped. (Westinghouse, Vol. 1, pp. 1-110, 1971.)

Cultural change impacts upon the Navy have, in many ways, a direct relationship to the training being administered, and how it is to be accomlished. So that training be the finest of any training being conducted, Navy personnel--particularly the school instructional staffs--need to know the materials with which they have to work. Now, we can complain about the types of students filling our high schools and even graduating from them--you know, those who cannot read, cannot express themselves effectively, cannot employ even basic number skills in a practical way, and who use drugs--and we do in a variety of ways. Alvin Toffler's breezy Future Shock, 1970, devotes a good deal of its best thrusts at the educational systems and philosophies which have provided us with the problems we perceive with our educated youth. He claims that children in school find themselves part of a standard and inflexible organizational system: a teacher-led class. As students move from lesson to lesson and grade to grade they remain immobile in the system and gain no experience with other organizational systems. They do not have the freedom to shift from one organization to another. They are simply prisoners of a system which lacks the capability to adapt to the students' requirements (Toffler, p. 362, 1970). Such school systems play a heavy role in providing the problems to the Navy. Many in the Navy's instructional systems have seen too many young adults who are not able to adapt to individualized learning systems, and those who are not able to handle the new-found environment of service life. (Really, the present day life for a sailor has a great deal more freedom than most recruits and students in advanced training were used to prior to entrance into the service.) I truly believe that this is an area requiring careful consideration by Navy instructors--the need to look carefully at the ability of all young adults to make the necessary adaptations to be able to perform well (and do so immediately) in a training system differing so much with what they have been used to.

Educational patterns have really changed very little over the past several decades and the challenges facing Navy instructors are confounding. Indications have been about for some time. Some years ago, Why Johnny Can't Read, (Flesch, 1955) caused a good deal of society to look critically at public school's apparent failure to meet the requirements of today's youth. Public outrage, deservedly or not, seemed to be the attitude of many communities in that era. A good documentary of the results of such public outcry is contained in two studies of an actual county, Montgomery in Maryland, which, for years, had the tradition of having the finest educational system in (at least) the metropolitan area of Washington, D.C. (Goldhammer and Farner, 1964 and Goldhammer and Pellegrin, 1968). The uneasiness of the public, its lack of confidence in its educational institutions, and the outward signs of public disagreement with its centralized government caused considerable turmoil which took decades to overcome. The public can (and in this case, did) apply so much pressure on the system, and in such a variety of ways, that the instructional staffs of the public school can be immobilized effectively through intimidation. In a sense, the societal structure that lends itself to such self-destruction is the "democratic way." In many cases the structure, pluralistic in nature, has actually served to hurt the system. Kerr (1969), pointed out that the "...pluralis-

tic structure...which enables all to have a voice in the decision-making process, and the structure to develop on its own of its own interests... appears to be too democratic in nature." Decision making can be"... thwarted by powerful interest groups (themselves representative of narrow issue-centered power structures)." And there are many issues about which to complain. One we hear so much about is the falling scores high school students register with Nationally-normed examinations. The Scholastic Aptitude Test for college-bound is an example. Recent reports of lower mean scores has led many people to jump dangerously to some certain conclusions. I saw, for instance, one radio and television commentator go on at great lengths about his notion on why the scores were dropping, although I suspect that he actually represented the thinking of a great many. He charged that the schools were to blame because of lack of discipline, the tendency to award a graduation certificate for mere attendance, and the like. You have heard them all before. As a matter of fact, there has been a drop in the national norm in recent years in both the verbal and mathematical scores. And although speculation is high as to why this drop has occurred, there is little evidence available to support it. (One is that the greater number of students taking it who formerly did not, since it has been only recently that the scores are required for admission to virtually all colleges, have dragged down the norm. Another, and in the same line, is that the "elite" of secondary school students only took the test formerly.) It is interesting to recall that the SAT mean is 500 with standard deviation 100. And it is also noteworthy that the standardization group was 10,654 students who were tested in 1941. Yet, as Philip DuBois notes in The Seventh Mental Measurements Yearbook (Buros, P. 344, 1972), "Ask for any conventional statistic about the SAT and one can be practically certain that it will be available: reliabilities, validity coefficients, and item data. Not only are they available but they also reflect highly competent workmanship and are amazingly consistent from year to year even though the program as a whole has undergone changes in conception and execution."

As an aside, one Navy school that consistently uses the SAT in its admission practices is the United States Naval Academy. Although the scores there have also dropped, admission policies adopted recently have resulted in a less severe drop than that reflected by the National norm (McNitt, 1974).

Another major study which had some notes of alarm for the American public was Charles Silberman's Crisis in the Classroom. This study was sponsored by the Carnegie Corporation and examined in depth the present conditions and deficiencies in the public schools. John Rich in his Challenge and Response: Education in American Culture (1974), says of Silberman's study:

> Too seldom are teachers, at whatever level, committed to a clear sense of purpose and direction. We are sorely in need of people who engage in self-scrutiny and serious thought about purpose. What is needed is to infuse schools and universities with thought

> about purpose and how what they are doing fulfills clearly conceived purposes. Unfortunately, there is a tendency to confuse daily routine with purpose and to transform routine into ends-in-themselves. The unwillingness to think seriously and deeply about purpose is not indigenous to educators and educational institutions, he believes, but is also characteristic of other occupations, professions, and institutions. The central task of teacher education is to provide teachers with a sense of purpose or a philosophy of education. Hence, history and philosophy should occupy a central place in teacher education. While these studies do not directly enhance practice, they raise the types of questions about the meaning of practice and the goals of one's activities to which all teachers should give great attention (Rich, p. 66, 1974).

Putting aside such highly visible problems perceived with our Navy's "feeder" or prep schools, the secondary schools of the Nation, I transit now to how we in the Navy view what needs to be done in order to train personnel received from such problem-ridden instructional institutions.

To achieve the necessary stages of adaptability required to meet the Navy's need for trained personnel through highly applied instructional programs, and in consideration of the large variation of students' backgrounds not only in educational level but in the philosophy or theory set used in the involved public education system, the Navy has had to introduce a number of innovations into its system. Indeed, it can be said that there is near total commitment on the part of the Navy's technical training community to the theory comprising the whole body of technology, technique, and strategies involving individualized learning systems. The attempt has been focused upon, as Knowles (1973) has paraphrased observations by Bandera, and carries over to teaching theory.

> Satisfaction derived from evident changes help to sustain successful endeavors, therefore, utilize objective records of behavioral change as an additional source of reinforcement for their self-controlling behavior....
>
> Since behavior is extensively under external stimulus control, persons can regulate the frequency with which they engage in certain activities by altering stimulus conditions under which the behavior customarily occurs... (Knowles, p. 81, 1973).

For the Navy instructor the future is quite tied to the present or presently-emerging concepts and movements in the Navy's schoolhouse. The most visible one is education technology.

The best tenets of modern education technology are being employed in order to bring about effective training in the Navy. One such method is computer managed instruction which has deep and direct roots in the earlier applied one of programmed instruction. And tied indirectly was the even

earlier applied one of task analysis. In short, the Navy has been lately embarked in a related series of interactive education technologies to meet the training needs of the operating forces. The focus has been highly goal-centered for the Navy's instructional staff who have been virtually the entire designers of the curricula. As was described by Bjerstedt (1972) in the listing of classifications of behaviors or taxonomies for goal analysis, several definitive and logical steps in instructional design are required. To a large extent, these procedures are contained in directives and, now, in a manual being distributed throughout the technical training community. This manual, Procedures for the Planning, Design, Development, and Management of Navy Technical Training Courses, reflects what is believed to be one of the more concise statements of good instructional design requirements, responsive to developing methodologies in training and adaptive to future training needs.

Long-range planning for the Navy schools is most certainly going to be a requirement for the Navy instructional staffs. This planning will need to be in consideration of the emerging social, political, and technological changes and challenges the Nation will experience. The entire relationship between training and job requirements will most certainly change dramatically (Dunnette, 1973). The Navy's training community will need to be sensitive to such changes. That means instructional staffs at every level will need to be responsive to them and this will only add to their burdens.

The technological advances that are certain to be introduced into the Navy will also have the effect for our instructors of turning out greater numbers of highly proficient technicians. If the suspicions of Wren-Lewis in Learning for Tomorrow - The Role of the Future in Learning are correct, the underdeveloped nations will have to draw their brainpower resources from countries such as ours (Toffler, p. 168, 169, 1974). We in the Navy are beginning to see the extent that other nations' navies are utilizing the limited valuable human resources available for such total weapon systems as the F-14 and the DD-963. It is not unreasonable to assume that the coming decades will require vast quantities of highly skilled personnel of the U. S. Navy in order to meet the needs of foreign navies. We all know that much more than petroleum is required to run an effective weapons platform.

Among the various references appropriate to review when one needs to look to the future, and there are many of them, there is an underlying feature that stands out when one considers the instructor. That feature is leadership. Many other words are used to describe this feature, including responsibility, but to Navy men the implication is the same. For the Navy instructor, it means that the qualities for effective leadership (some of which have to be learned but some of which can be gained only by experience) are paramount. He must be primarily an expert in his technical specialty, must wear the uniform, and must be able to communicate his skills and personal qualities to other Navy men. Such men as these should first be selected for instructor duty then learn the techniques and strategies to impart them to others of his particular skill cluster. It will be this type of man, elite in his skill and of such qualities as were earlier

attributed to Rodway (Westinghouse, 1972) who will be most able to both design and impart the instruction for the others who will follow in his footsteps.

Those who are truly interested in the future and its potential for the Navy instructor should look all about the present instructor, his role and responsibilities. Then, in the very fundamental methods used by true futurists, should set long-range goals so that this sub-profession does not suffer from being reactive to trends and being continually on the defensive. We know that the technology and tools instructors will be using at the dawning of the twenty-first century are either in hand now or they exist in, at very least, the formative stages. What remains to be done is merely setting into motion, at this time, those forces that best focus upon that future man in uniform presently symbolized by a podium. Whatever replaces that podium will have significant effect upon that man, but it has become quite clear to me during the past decade, that the replacement process stops quite short of the man himself. And believing in the science of the futurist, not only should we project an image in our liking of the particular man, we should bend every effort to assure that the forces in support of the energies and resources we are about to expend are to our liking two decades hence, and result in the materialization of that image.

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