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ENLISTED PERSONNEL INDIVIDUALIZED CAREER SYSTEM (EPICS) TEST AND EVALUATION: INTERIM REPORT

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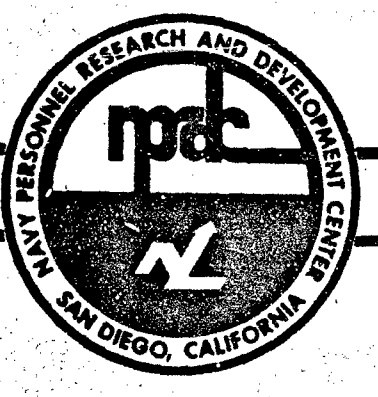

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ENLISTED PERSONNEL INDIVIDUALIZED CAREER SYSTEM (EPICS) TEST AND EVALUATION: INTERIM REPORT

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This report provides preliminary results of the test and evaluation (T&E) of the enlisted personnel individualized career system (EPICS), which is based on the integrated application of job performance aids (JPAs), standardized shipboard instructional modules, and deferred shore-based technical training. Objectives included reduced costs of first-enlistment training, shortened shore-based training episodes, reduced skill-knowledge deterioration, and expansion of manpower resources for the technical ratings.

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The EPICS T&E is being conducted in the fleet using the NATO Seasparrow Surface Missile System (NSSMS), which is operated and maintained by personnel in the fire control technician (FT) rating. A cohort of 146 EPICS personnel were originally assigned to 30 DD 963 class ships and to 4 CVs in the Pacific and Atlantic Fleets. Approximately half of this sample were ineligible for the FT rating "A" school. FT and general detail (GENDET) groups are being tracked with the EPICS cohorts for comparison purposes. Interim findings (18 months) suggest that (1) EPICS personnel attrition from the Navy is 50 percent lower than GENDETs and about equal to the FTM cohort, (2) most attrition (77%) from the EPICS program occurred prior to the first shore-based training investment, (3) JPAs were considered helpful by EPICS shipboard administrators and personnel but were considered too prescriptive for frequently performed tasks, (4) supervisor ratings of the ability of EPICS subgroups and "A" school graduates to perform apprentice-level tasks were similar, (5) at the first shore-based training episode, EPICS personnel completing the FT curriculum required less time than their FT counterparts, and (6) cost analysis data contrasting EPICS with the conventional front-end loaded training approach indicate a potential cost avoidance of 30 percent.

FOREWORD

This effort was conducted under advanced development task area Z0828-PN (Enlisted Personnel Individualized Career System (EPICS)) and was sponsored by the Deputy Chief of Naval Operations (OP-01). The EPICS program, which was developed using an integrated personnel systems approach (IPSA), delays formal school training until after personnel have received shipboard on-job training complemented by job performance aids (JPAs). Early phases of the program, which involved developing the IPSA EPICS model, extending and refining JPA technology, formalizing techniques for exporting and administering training on board ship, and developing R&D implementation techniques have been described in a series of Center reports (TRs 77-33, 78-26, and 79-25; SRs 83-32 and 83-39; TNs 79-1 and 80-14). A detailed description of the conception and development of the EPICS IPSA model, the execution of the front-end job design analyses, JPA and instructional module development, and EPIC implementation is provided in NPRDC TR 84-15, which was developed as a companion to this report.

This report describes the ongoing, longitudinal test and evaluation (T&E) of EPICS in the fleet as an experimental personnel system concept. This T&E includes comparison of the performance of EPICS personnel with that of personnel trained under the conventional personnel system (CPS); appraisal of JPA skill enhancement value and user acceptance. rating of utility of self-teaching exportable training modules; tracing the progress of Navy subjects through the various stages of the program; determination of the program's impact on personnel motivation, attrition, and retention; and comparison of training costs under EPICS and CPS. Since T&E is still underway, the results and conclusions presented herein are preliminary. Preliminary results of the cost comparison were provided in NPRDC SR 83-23 and summarized herein. Results of subsequent data evaluation and analysis will be provided in a follow-on report, to be published in approximately 1 year. In addition, other reports will be published addressing JPAs, the ship/shore instructional program, cost effectiveness approaches, R&D implementation problems, etc.

EPICS implementation and test constitutes one of the more ambitious, far reaching R&D endeavors undertaken by the Navy MP&T community. The number of problems and impediments encountered in the course of implementing and testing EPICS far exceeded expectations and has methodological implications for conducting large-scale studies in the fleet. Numerous individuals in the military and civilian offices of the Navy have aided the program through their enthusiasm and support of EPICS' objectives. An attempt to identify and properly acknowledge all the individuals who played a role in the EPICS accomplishment is not possible. However, sincere appreciation is extended for the constructive suggestions, willingness to listen before passing judgment, and support for a new approach to an old problem.

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SUMMARY

Problem and Background

The Navy continues to face such problems as increasing training costs and ever-tightening budgets, along with the need to man complex systems with highly technically qualified personnel. Specific concerns include long and congested training pipelines, skill/knowledge deterioration, lack of effective shipboard skills training, and less than fully effective use of available personnel capabilities. In response to those concerns, an integrated personnel systems approach (IPSA) was employed to develop the enlisted personnel individualized career system (EPICS), which attempts to reduce training costs by deferring expensive shore-based training. It provides apprentice personnel with on-the-job experience, complemented with job performance aids (JPAs) and self-paced instructional materials. After these personnel have completed apprentice technician duty (ATD) and demonstrated satisfactory job performance to their supervisors, they are sent to shore-based equipment technician training (ETT) and, eventually, to system technician training (STT) during their enlistment. Thus, the EPICS program integrates technical progress, shipboard adjustment, and educational opportunities into an individualized career path.

EPICS was conceived as a career system that could only be empirically tested by being subjected to the everyday conditions of the operational Navy. Thus, it was decided to test the EPICS concept through a longitudinal field implementation. The particular career path selected was that of the fire control technician (surface missile) (FTM) rating used to man the NATO SEASPARROW Missile System (NSSMS). The 146 EPICS personnel completing recruit training were assigned to 30 DD 963 class ships and to 4 CVs divided equally between the Pacific and Atlantic Fleets. Approximately half of this cohort was ineligible for the FTM formal training, based on a composite of ASVAB scores.

Objectives

This report describes the ongoing, longitudinal evaluation of EPICS in the fleet. The major objective of the evaluation is to assess the overall cost effectiveness of the various initiatives and approaches comprising EPICS and to appraise the value of EPICS as an alternative to current technical career paths. Specific evaluation areas included are: (1) cost effectiveness of deferring training compared to existing front-end loaded training, (2) efficacy of providing initial skills training on board ship, (3) progress of technical school eligible and ineligible personnel through the EPICS career path, (4) effectiveness of JPAs in terms of skill enhancement value, acceptance by fleet personnel, and cost, (5) utility of self-teaching "exportable" training modules on board ship in building competence and facilitating individual career progression, and (6) program impact on personnel motivation, attrition, career progression, and retention.

Approach

Evaluating the EPICS project required consideration of the longitudinal, operational, and multi-organizational nature of the fleet test. The approach used included (1) careful observation of the trial program, (2) diversity of evidence, including a heterogeneous sample scattered over a number of distinct settings to provide a more representative evaluation, (3) rival comparison groups, and (4) controlled assignment of membership in study groups by project administrators. In addition, measures were incorporated to fulfill the need for program feedback data for project management.

Findings

Data collection has been underway for about 24 months. Preliminary data trends are noted below; however, final judgment of the various EPICS initiatives must await completion of the evaluation.

1. A deferred training, early at-sea assignment program appears to be attractive to GENDETs in recruit training.

2. As of February 1983, EPICS Navy attrition was 50 percent less than that of the GENDET cohort and about equal to that of the FTM cohort (8%). Disenrollment from EPICS (77% of total attrition) generally occurred prior to the first shore-based training investment. Total attrition of the non-school-eligible cohort is less than the school-eligible cohort, although the difference is decreasing. Attiriton trends suggest that the relatively high-risk periods occur within the first 24 months. Risk level for the remainder of the program should be considerably less.

3. Transfers from the EPICS program to deck force or other ratings was 24 percent for the entire EPICS cohort.

4. FT-eligible ETT students who completed instructional modules 1-25 had faster course completion time than did the FT-track BE&E group and the EPICS school-ineligible group. Those school-ineligible ETT students who completed instructional modules 1-25 also had faster course completion times than the BE&E group. These results are tempered by the fact that roughly half of the EPICS ineligible group, and about a fifth of the EPICS eligible group did not complete modules 1-25 during the 14-week ETT school but were allowed to complete the series after return to shipboard duty. Data are being collected currently to determine the final number of individuals in each subgroup who can be considered ETT graduates.

5. Supervisory ratings indicate little difference in technical assignment confidence between either EPICS cohort and "A" school graduates.

6. JPAs were considered helpful by fleet supervisors in aiding maintenance performance of EPICS personnel, although EPICS personnel quickly transferred to the use of maintenance requirement cards (MRCs) because they constituted the "peer-accepted" documentation. Further, the fully proceduralized JPAs were considered more detailed than necessary.

7. The self-teaching exportable modules (STEPS) used on shipboard were considered a useful and viable approach to competency building. However, some EPICS personnel noted the typical problem of finding time and acceptable study locations on board ship. Completion of STEPS requires self-discipline and commitment on the part of each individual; those without those attributes tended to self-select themselves out of the program.

8. The quality of shipboard administration of EPICS varied from ship to ship. Supervisory effectiveness and encouragement, particularly at the work center level, directly influenced progress made by many EPICS personnel. While the aid of the EPICS fleet representatives was useful here, variation in supervisory quality is a reality of shipboard life and requires adjustment by EPICS personnel in a self-paced instructional program.

9. Cost analyses contrasting EPICS with the current technical career path (BE&E, "A," and "C" schools) indicates a potential 30 percent cost avoidance using a deferred distributed personnel system such as EPICS. This savings might be increased further if less detailed JPAs are required. In addition, there appears to be a potential 3-to-1 advantage in manpower utilization by tapping the "school-ineligible" pool. These are preliminary findings, however, and require consideration of many personnel effectiveness variables before an overall cost effectiveness decision can be made.

10. Fleet feedback through commanding officer's narrative reports (CONARS) has been generally positive, with some recommendations for expansion of the program.

11. A transfer mechanism for implementing an R&D product the scope of EPICS within the Navy's manpower, personnel, and training institution appears to be lacking.

Future Plans

Milestones necessary to complete the T&E are listed on pages 29 and 30.

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INTRODUCTION

Problem

The Navy continues to face such problems as increasing training costs and ever-tightening budgets, along with the need to man complex systems with highly technically qualified personnel. Specific concerns include long and congested training pipelines, skill/knowledge deterioration, lack of effective shipboard skills training, and less than fully effective use of available personnel capabilities.

Background

In response to those concerns, an integrated personnel systems approach (IPSA) was employed to develop the enlisted personnel individualized career system (EPICS), which attempts to reduce training costs by deferring expensive shore-based training. It provides apprentice personnel with on-the-job experience, complemented with job performance aids (JPAs) and self-paced instructional materials. After these personnel have completed apprentice technician duty (ATD) and demonstrated satisfactory job performance to their supervisors, they are sent to shore-based equipment technician training (ETT) and, eventually, to system technician training (STT) during their enlistment. Thus, the EPICS program integrates technical progress, shipboard adjustment, and educational opportunities into an individualized career path. The implemented EPICS model currently being evaluated was described in detail by Blanchard, Smillie, and Conner (1984) and is illustrated in Figure 1.

EPICS, which was designed to test the IPSA concept (Blanchard & Smillie, 1980) and to address various Navy personnel problems, was expected to achieve the following:

1. Reduce the investment in shore-based training for first-term enlistees while maintaining on-job effectiveness in the fleet.

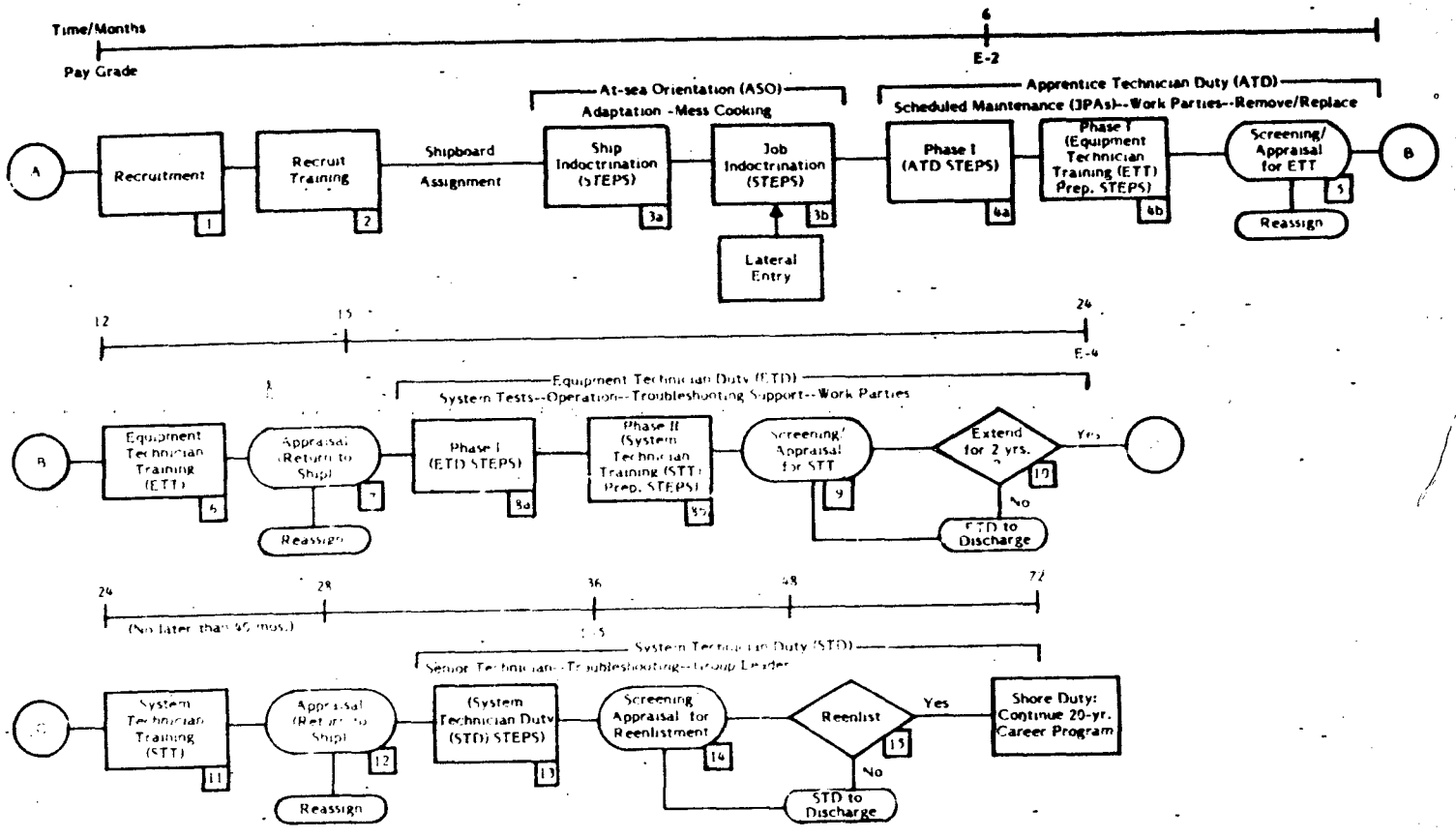
2. Improve span and definition of career path structure and the coincidence of that structure with shipboard system organization.

3. Expand the personnel resource pool for a technical rating through successful utilization of individuals ineligible for technical schools (based on ASVAB scores).

4. Improve employment of motivated, capable personnel early in their Navy careers.

5. Facilitate personnel adaptation to military and shipboard social and physical environments.

Enrollment of EPICS personnel commenced in July 1980 during routine classification interviews conducted at the Recruit Training Command (RTC), San Diego. EPICS candidates were selected from the general detail (GENDET) recruits; that is, those who had not entered the Navy with school guarantees. The prospective EPICS recruit was briefed on the program, shown the materials, and offered a billet on a specific ship. If possible, his preference for the Atlantic or Pacific coast was considered. The Navy classifiers (Personnelmen--N=4) who recruited EPICS personnel received no special training other than review of the program, the recruiting pamphlet, and the EPICS recruit's handbook.



STEPS = Self-teaching exportable packages (Instructional modules)

Figure 1. EPICS 6-year career system model.

A total of 158 EPICS candidates was enrolled to fill billets on 34 ships (four billets on each of 30 DD 963-class ships and five billets on each of 4 CV-class ships) in the Pacific and Atlantic fleets. The NATO SEASPARROW Surface Missile system (NSSMS), which is operated and maintained by personnel in the fire control technician (surface missile) (FTM) rating, was selected as the test system. Candidates were assigned to two groups, depending on whether or not they were eligible to attend Fire Control Technician (FT) "A" school, based on scores obtained on the Armed Services Vocational Aptitude Battery (ASVAB).[1]

The FT-ineligible group was included in the EPICS program to determine whether a lesser aptitude group, as defined by ASVAB composite scores, would add effectively to the Navy's technician manpower pool. If the performance of the FT-ineligible group does not differ significantly from that of the FT-eligible group and personnel in the FTM rating, this subgroup can be used to increase the available number of potential FTM trainees, resulting in a net favorable consequence to the Navy.

Table 1 gives EPICS manning levels in each group for Atlantic and Pacific fleets of the 146 candidates remaining after recruit training. The average armed forces qualification test (AFQT) scores given provide an additional descriptive measure of the two groups.

Table 1

EPICS Manning Levels for Atlantic/Pacific Fleets

Group	Fleet Assignment			Average AFQT Score
	Total	Pacific	Atlantic	
FT-eligible	75	42	33	77.1
FT-ineligible	71	33	38	54.2
Total	146	75	71	

Objectives

This report describes the ongoing, longitudinal evaluation of EPICS in the fleet as an experimental career system. The major objective of the evaluation was to assess the overall cost effectiveness of the various initiatives and approaches comprising EPICS and to appraise the value of EPICS as an alternative to the conventional personnel system (CPS). Specific objectives were to determine:

1. The cost-effectiveness of deferring training compared to existing front-end loaded training.

[1]To be eligible for FT "A" school, recruits must have a composite score of 218 on ASVAB subtests related to skills in that school (EI+MK+GS+AR). It should be noted, however, that recuits scoring below 218 are eligible for other "A" schools.

2. The efficacy of providing initial skills training on board ship.

3. The progress of FT-ineligible personnel through the EPICS career path.

4. The effectiveness of JPAs in terms of skill enhancement value, acceptance by EPICS personnel, effect on accomplishing shipboard maintenance, and cost.

5. The utility of self-teaching "exportable" training modules on board ship in building competence and facilitating individual career progression.

6. The EPICS program's impact on personnel motivation, attrition, career progression, and retention.

A detailed description of EPICS design, development, and implementation is provided in Blanchard et al., 1984.

METHOD

Design

Since EPICS was conceived as a personnel system, its proper evaluation argued for an empirical field test in which it could be subjected to the everyday conditions of the operational Navy. Use of a strictly controlled test environment, such as a contrived school situation or a series of short-term "snapshot" studies in the fleet, could not satisfy test and evaluation (T&E) objectives, particularly for those aspects of EPICS that concern career development and performance aiding. Such aspects could only be appraised as a function of "real-time" events and circumstances. For these reasons, it was decided to test the various hypotheses associated with the EPICS concept through a longitudinal field study approach. This decision recognized that experimental controls primarily designed to satisfy inferential statistical assumptions could rarely be employed, given the constraints of the fleet environment.

An evaluation plan was needed that was adaptable to the unique aspects of the EPICS system and the constantly changing shipboard test environment. Researchers (Cronbach, Ambron, Dornbusch, Hess, Hornik, Phillips, Walker, & Weiner, 1980; Patton, 1978) have maintained that observation of trial interventions in a diversity of settings can be more instructive and yield a richer data base than restricting the study to a narrow set of highly controlled conditions. Thus, in the EPICS evaluation design, shipboard test realities were considered variations to be capitalized on and adopted to rather than problems to be circumvented. The approach adopted to evaluate EPICS used the variety of test sites as a method of generalizing from findings to the fleet and incorporates measures that provide program feedback data to project management.

To provide the most useful mix of documentation for the diverse information needs of EPICS users, administrators, evaluators, sponsors, and the R&D community, three forms of evaluation (Snyder, Roben, & Farr, 1980) were incorporated into the test design:

1. Implementation evaluation, which concerns the degree to which a program has been implemented as planned in the test environment.

2. Formative evaluation, which involves ongoing feedback throughout the test period with respect to needed modifications to equipment, procedures, and materials.

3. Summative evaluation, which employs outcome measures to determine whether or not program objectives have been achieved.

Also, a cost-effectiveness evaluation is being conducted, which compares the formal training and ancillary support costs required to qualify FTMs to operate and maintain the NSSMS using the EPICS and CPS paths. Preliminary results of this evaluation are described in detail by Megrditchian (1983).

Variable Selection

Roth, Brett, and Joyce (1980) generated a set of candidate variables that appeared to be relevant to EPICS objectives and information needs. These variables were then screened to determine if they would yield sufficient information to address EPICS T&E questions adequately. The remaining variables were finally organized into three groups--those measuring personnel effectiveness, EPICS program elements, and program cost effectiveness. Variables included in these groups are listed in Table 2.

The personnel effectiveness variables relate to all personnel outcomes that are influenced by a particular career path, whether it be EPICS or CPS. The EPICS program variables assess the degree to which each EPICS system element (e.g., JPAs, shipboard instructional program, shore-based training) was implemented and influenced cohort performance. The effectiveness variables, which will eventually be paired with previously developed aggregated cost values (Megrditchian, 1983), were selected from the complete set of candidate variables through a screening process based on six measurement efficiency factors: relevance, specificity, cost, attainment difficulty, attainment intrusiveness, and criticality to program evaluation. These three evaluation categories will be used to contrast EPICS and CPS, describe the functioning of EPICS, and determine its cost effectiveness.

Comparison Groups

Two longitudinal comparison cohorts were included in the EPICS T&E plan. Members of these cohorts are being tracked throughout their enlistment.

1. A cohort comprised the 139 FT-track students who had attended the Basic Electricity and Electronics (BE&E) Preparatory School in San Diego from September 1980 through August 1981. This time frame coincides with the enrollment period for EPICS personnel.

2. A stratified random sample of 516 male GENDET personnel who graduated from recruit training between September 1979 and June 1980. As indicated previously, EPICS personnel were selected from GENDET recruits.

Other comparison groups included in the T&E were:

1. The population of recruits (N = 26,963) who had attended the Naval Training Center (NTC), San Diego from October 1980 through September 1981 (i.e., FY81). This time frame coincides with the EPICS enrollment period.

2. A group of FT-track students (N = 682) who attended BE&E schools at San Diego or Great Lakes between June 1981 and January 1983. This time frame corresponds with the period when EPICS personnel received equipment technician training (ETT).

3. Samples of NSSMS supervisors and coworkers aboard the 34 ships participating in the EPICS test. The sample sizes vary according to the measure employed.

Table 2

Variables Used in EPICS Evaluation

Variable	Definition
Personnel Effectiveness	
Aptitude distribution	Proportion of personnel drawn from each mental category based on AFQT score.
FTM eligibility	Proportion of personnel eligible for FTM technical schools, based on aptitude scores.
Skill level advancement	Proportion of enlistment at each technical skill level.
Program survivors	Proportion of personnel entering the EPICS and CPS career paths and completing 4 years of enlistment.
Attrition	Proportions of personnel attriting from the Navy or disenrolled from EPICS program.
Reenlistment	Ratio of reenlistees to first-term accession.
Supervisor assessment	Supervisor confidence of assignability to technical tasks.
Advancement in rate	Rate advancement during first enlistment.
Shipboard contribution	The proportion of time in a skill level that personnel productively contribute to the operational work force.
Troubleshooting proficiency	Troubleshooting achievement during electronics casualty simulations.
School performance	Amount of time, academic progress, and costs related to course completion.
Job satisfaction	Personnel perceptions of satisfaction with job in NSSMS work center.
Commitment	Personnel perceptions of commitment to completing enlistment.
Adjustment	Personnel perceptions of adjusting to shipboard life.
Met expectations	Degree to which expectations of shipboard life differ from actual experiences.
EPICS Program Elements	
Job performance aids (JPAs):	
Usage	The frequency with which JPAs are employed for performing maintenance tasks.
Usability	Accuracy, relevance, and presentation of the technical information.
User acceptance	Expressed preference of technician for using JPAs for maintenance tasks.

Table 2 (Continued)

Variable	Definition
EPICS Program Elements (Continued)	
Equipment technician training (ETT):	
Extra study time	Number of study hours in addition to the normal school day.
Course completion time	Number of calendar days for completion of a specified number of modules.
Total study time	Number of normal study hours to complete a specified number of modules.
Degree of shipboard preparation	Number of preparatory modules completed aboard ship prior to school attendance.
Predicted completion time	Number of study hours predicted for an individual based on aptitude.
System technician training (STT):	
Pre/post technical tests	Basic electronics and digital electronics test scores.
Frequency of remediation/setbacks	Number of times a student is given remediation training or setback in the school.
Degree of shipboard preparation	Number of prepatory modules completed aboard ship prior to school attendance.
Lesson test scores	Test scores upon completion of each lesson series.
EPICS program management:	
Fidelity of implementation	Degree to which the program was implemented as originally planned.
Support requirements	The type and frequency of personnel, material, and financial support.
Interagency coordination	Coordination of administrative and financial responsibilities between personnel agencies.
Ship/shore rotation impact	Impact of EPICS technician school attendance upon NSSMS work center workload.
Program Cost Effectiveness	
Aptitude distribution	Proportion of personnel drawn from each mental category based on AFQT score.
Proportion of program survivors	Proportion of personnel entering the EPICS and CPS program and completing 4 years of enlistment.
Total attrition rate	Ratio of attritees to first-tour accession.
Reenlistment rate	Ratio of reenlistment to first-tour accession.
Proportion passing FTM E-4 exam	Proportion of FTM striker group passing FTM E-4.
Supervisor assessment	Supervisor confidence of assignability to technical tasks.
Advancement in rate	Rate advancement during first enlistment.
Shipboard contribution	The proportion of time in a skill level that personnel contribute to the operational work force.
Job satisfaction	Individual perception of satisfaction with his job in work center.

Instruments

Feedback Surveys

To assess EPICS program elements, two feedback questionnaires were developed. Questionnaire items addressed such topics as EPICS shipboard administration, group assimilation, shipboard adjustment, program support, EPICS, JPAs, instructional programs, and documentation. Also, items were included that related to motivation, individual expectations, job satisfaction, and commitment (Landau & Farkas, 1978). All items were Likert-scaled from 1 (to very little extent) to 5 (to a very great extent) and subjects used an optical scan answer sheet to record their responses.

Subject groups surveyed on board ship were EPICS personnel, EPICS shipboard administrators (ESAs), and non-EPICS personnel in the work center. One of the two feedback surveys developed was mailed to the 34 ESAs 6 months after EPICS personnel had reported aboard their respective ships, and the other was administered to EPICS personnel whey they commenced equipment technician training (ETT). The ESA survey included 47 items, 17 on JPAs and 14 on the shipboard instructional program. The recruit survey included of 73 items, 11 on JPAs and 13 on the shipboard instructional program.

Rating Forms

Two supervisor rating forms were developed, one for rating EPICS personnel; and the other, for rating their NSSMS co-workers. After EPICS personnel had completed ATD, their supervisors were asked to indicate how much assistance each individual needed to perform tasks in the following technical areas:

1. Clean, inspect, and lubricate.
2. Remove and replace.
3. System tests.
4. Ordnance handling.
5. Adjustment of system components.
6. System operation.
7. Fault isolation (troubleshooting).

Responses were to be made on a 5-point scale ranging from 1 (not at all confident; always required assistance) to 5 (extremely confident; never requires assistance). If appropriate, supervisors could indicate that the individual had not been observed or had not performed tasks within a particular category. After EPICS personnel had been aboard ship for 12 months, the supervisors were asked to rate their NSSMS co-workers on the seven task areas. These NSSMS co-workers were rated anonymously and were grouped according to degree of (1) formal training (no training, "A" school and "C" school), and (2) shipboard experience (less than or greater than 1 year) at each training level.

Interviews

The first structured interview was conducted during a briefing session with EPICS recruits before they graduated from recruit training. This interview covered background information (e.g., science, mathematics, vocational, and electronics courses taken; experience, etc.) and first impressions of the EPICS program. The second interview form was used during shipboard sessions with EPICS personnel, ESAs, NSSMS supervisors, and NSSMS co-workers approximately 12 months after EPICS personnel had reported aboard. These interviews covered work center manning, general impressions of EPICS in the

shipboard environment, administrator duties, EPICS fleet representative assistance, progression of on-job duties and instructional modules, use of JPAs and maintenance requirement cards (MRCs), modification suggestions, and impact of EPICS personnel in the NSSMS work center.

ETT Tracking Form

Data on EPICS personnel performance in ETT was collected via a tracking form maintained by the ETT course instructors. This form noted the amount of shipboard preparation EPICS personnel had received prior to attending ETT and tracked their ETT performance in terms of accumulated hours, days, and extra study required to complete each module series. The total number of modules completed at the school was also documented.

Career Progress Form

A career progress form was included as part of the Shipboard Administrator's Guide to help ESAs monitor the progress of EPICS personnel. This form is an integral part of the standardized shipboard training package implemented aboard participating ships. It provided shipboard data on instructional progress and completion of military requirements for evaluation purposes and was collected by the EPICS fleet representatives.

INTERIM FINDINGS

Data Collection Status

Data collection on certain variables began when EPICS personnel were selected during recruit training. Shipboard data collection began in September 1980 when the first EPICS personnel reported aboard their respective ships. At the same time, tracking of comparison groups was begun by the Defense Manpower Data Center (DMDC) for such variables as military advancement and Navy attrition. Recruit training attrition data was provided by the Center for Technical Training (CNTECHTRA). An additional source of information on fleet user perceptions of EPICS were the quarterly Commanding Officer's Narrative Reports (CONARS). Sources and time frame of cost data collection have been fully detailed in Megrditchian (1983).

Data collection has been underway about 24 months and interim findings are available on the following:

1. EPICS enrollment inducement potential for GENDET personnel.

2. Attrition of EPICS personnel from the Navy and from the EPICS program.

3. Performance of EPICS personnel in ETT as compared with that of FT BE&E students.

4. Supervisor ratings of the ability of EPICS personnel to perform various tasks after they complete ATD, as compared to FT "A" school graduates.

5. ESA and EPICS personnel perceptions of JPAs and the shipboard instructional program.

6. Relative costs of EPICS and CPS (Megrditchian, 1983).

Data will continue to be collected throughout the T&E period. Data comparing EPICS personnel with "C" school graduates on troubleshooting performance will be collected after EPICS personnel complete STT. In addition, comparative supervisory technical evaluation data will be available for NSSMS FTM "A" and "C" school graduates.

Comparison Group Demographics

Table 3, which provides demographic characteristics for the three longitudinal cohorts, shows that, although they were quite similar as to education level, ethnic affiliation, entry marital status, and number of dependents at entry, they differed substantially as to race, AFQT scores, mental level category, and entry age. Over 90 percent of the EPICS and FTM samples were caucasian, compared to 74 percent of the GENDETs. Most of the difference was due to the higher percentage of blacks in the GENDET sample.

Table 3

Demographic Characteristics for Longitudinal Samples

Characteristic	EPICS Overall (N=158)	EPICS FT-elig. (N=84)	EPICS FT-inelig. (N=74)	FTM (N=139)	GENDET (N=516)
Education level (ave. yrs.)	11.6	11.7	11.6	12.0	11.5
Race (%):					
Caucasian	92	96	83	93	74
Black	5	2	9	2	19
Other	3	2	8	5	7
Ethnic Group (%):					
None	87	88	86	89	82
Asian	1	0	1	2	2
Filipino	1	0	1	2	3
Mex./Amer.	2	1	4	1	0
Amer. Indian	1	0	1	1	1
Other	8	11	7	5	12
AFQT score (ave.)	66	77	54	75	50
Mental Level Category (%):[a]					
I	4	7	0	12	2
II	61	87	31	71	15
III	35	6	69	17	83
Entry age (ave.)	18.8	18.8	18.9	19.8	19.3
Entry marital status (%):					
Single	100	100	100	96	97
Married	0	0	0	4	3
Dependents at entry (N)	0	0	0	0	0

[a]Based on AFQT scores: I = 93-100; II = 65-92; III = 31-64.

Average AFQT (general aptitude) scores reflect expected differences between groups, given their selection criteria. The AFQT average of the FTM and EPICS FT-eligible samples are representative of Mental Category II personnel, while the average of the EPICS FT-ineligible sample is representative of Mental Category IIIA personnel. The GENDET average is slightly lower. The EPICS FT-ineligible sample typifies, in terms of general aptitude, the next lower mental group category from which FTMs are commonly selected. As indicated previously, this group is central to evaluating the EPICS program objective of expanding the technical personnel resource pool.

Entry age differences between the comparison groups could have implications for such personnel variables as attrition. The EPICS sample, on the average, is 1.0 year younger than the FTM sample and half a year younger than the GENDET sample. Thus, the EPICS sample seems to be composed of extremely recent high school graduates, while the FTM and GENDET samples are composed of slightly older personnel. As attrition has been previously linked with age (Evanco, 1979), the influence of this variable will be considered in final attrition analyses.

Personnel Effectiveness

Attrition Data

As shown in Table 4, the overall attrition rate for EPICS personnel during recruit training was 8 percent, which is comparable to the 10 percent attrition rate for the FY81 recruit stream for RTC San Diego. However, the attrition rate for the EPICS FT-eligible group was almost three times as high as that for the FT-ineligible group (11% vs. 4%). After recruit training, EPICS personnel attrites fell into two categories: (1) Navy attrites, which consists of those who are losses to the Navy; and (2) EPICS program attrites, which consists of those who, for various reasons, were disenrolled from the EPICS program but who remained in the Navy in a rating other than FTM.

After recruit training, the Navy attrition rate for the overall EPICS sample was 7 percent, compared with 12 percent for the GENDET sample and 7 percent for the FTM sample. Thus, to date EPICS Navy attrition is the same as that of conventional track FTMs. This is significant because EPICS personnel were selected from the GENDET population, whose Navy attrition rate in this study is almost 50 percent greater.

In addition, 35 personnel--24 percent of those who completed recruit training--attrited from the EPICS program, leaving a total of 101 personnel or 69 percent of those who completed recruit training as of February 1983. Of the 35 program losses, 4 struck for an alternative rate (based on their CO's recommendation) and are certainly contributing to the Navy. In fact, the early shipboard duty (prior to any training commitment) provided by EPICS allowed them to become informed decision makers with respect to their careers. The other 31 program losses were assigned to the deck force, so they are still contributing to fleet needs in a less technical capacity. Although the 35 program attrites are not losses to the Navy, they are losses to their work centers and/or divisions and would require the Navy to input additional personnel at recruit commands to maintain FTM (0000) manning levels. The replacement cost per program attrite to the Navy, however, is quite low provided they have not attended ETT. Continued tracking of the EPICS program attrites will determine the proportion of this group who subsequently attrite from the Navy.

Table 4

Attrition Data

Sample	Total N	Nonattrites N	Nonattrites %	Attrites: Navy N	Attrites: Navy %	Attrites: EPICS Program N	Attrites: EPICS Program %	Attrites: Total N	Attrites: Total %
During Recruit Training									
EPICS:									
FT-eligible	84	75	89	9	11	---	---	9	11
FT-ineligible	74	71	96	3	4	---	---	3	4
Total	158	146	92	12	8			12	8
San Diego RTC population--FY81	26,963	24,304	90	2,659	10	---	---	2,659	10
After Recruit Training (As of February 1983)									
EPICS:									
FT-eligible	75	52	69	4	5	19	25	23	31
FT-ineligible	71	49	69	6	8	16	22	22	31
Total	146	101	69	10	7	35[a]	24	45	31
FTM	139	130	93	9	7	---	---	9	7
GENDET	516	456	88	60	12	---	---	60	12

[a]Includes 31 who were assigned to the deck force and 4 who struck for another rate.

Supervisor Evaluations

As indicated previously, supervisors were asked to rate EPICS personnel who had completed ATD and their NSSMS co-workers on their ability to perform various tasks without assistance. Thirty of the 34 supervisors rated their confidence in 75 EPICS personnel (39 FT-eligible and 36 FT-ineligible) to perform these tasks. The average shipboard time for this group was 15 months. Also, 19 of the 34 supervisors completed forms rating 23 NSSMS co-workers who were identified as Phase I FT "A" school graduates. These individuals had had more than 1 year of shipboard experience (approximately 18 months time-in-service).[2] Table 5 presents comparative data for the

[2]Supervisory ratings are also being collected on EPICS personnel during equipment technician duty (ETD) and on the corresponding FT "A" school graduate group. These findings will be presented in a future report.

EPICS and FT "A" school graduate samples. As shown, none of the differences in group performance were statistically significant except for the difference between the EPICS FT-ineligible and "A" school graduate samples for the "remove and replace" task area; however, this task area is strongly influenced by the NSSMS failure rate on each ship. This suggests that work center supervisors perceived little difference between the three groups in their ability to perform apprentice level tasks.

Except for the "remove and replace" and "troubleshooting" task areas, ratings for the three samples clustered between 3 (sometimes) and 4 (rarely), indicating a fairly high supervisory confidence in the ability of EPICS personnel to perform tasks. Lower scores on troubleshooting tasks for these groups can be expected, since the training and experience required to perform such tasks are acquired over a longer time period. It should be noted, however, that the EPICS groups will acquire some of that electronics knowledge in shore-based ETT, whereas the "A" school graduates have already received all the shore-based training available for their first enlistment.

School Performance

After completing ATD, EPICS personnel are eligible for ETT, held at the Navy Schools Command, San Diego. ETT is scheduled for 14 weeks with returnable quotas and is composed of five sets of instructional modules: 1-14, 15-19, 20-25, 30-34, and 40-44. Modules 1-25 are identical to those used in BE&E by FT-track personnel. The remaining two sets were developed especially for the EPICS program.

ETT is a fixed-time (14 weeks), variable-content school, while BE&E is a variable-time (self-paced), fixed-content school. Before EPICS personnel attend ETT, they are strongly urged to complete preparatory Modules 1-14 during ATD to ensure that they will be able to complete Modules 1-34 within the 14-week period. To ensure mastery of the content in the 14 preparatory modules, all EPICS personnel were required to "test-out" on these modules in ETT before being allowed to proceed to subsequent modules.

Figure 2 compares the time required for EPICS groups and the FT-track BE&E graduates to complete Modules 1-11 and 1-25. As indicated previously, the FT-track group attended BE&E during the same time frame the EPICS groups attended ETT. As shown, both EPICS groups required less time to finish Modules 1-25 than did the FT-track group, with the FT-eligible group requiring the least time. These results are tempered by the fact that roughly half of the EPICS FT-ineligible group, and about a fifth of the FT-eligible group did not complete Modules 1-25 during ETT. The reasons for this lack of academic progress and the influence of the number of prepratory modules EPICS students completed on school progress will be addressed in a future report.

Advancement in Rate

Table 6 provides advancement-in-rate data for EPICS personnel. The higher frequency of E-4s and E-5s in PACFLT is primarily due to temporal differences in program enrollment. Baseline data on the number of personnel recommended for advancement, taking the test, and passing the test on a particular trial are not currently available. These data will be obtained if possible to better illustrate progress of EPICS personnel in general and as a function of eligibility group.

Relative differences between eligibility groups is slight up to the E-4 point, with differences beginning to favor the FT-eligible group after that rate. It may be that relatively fewer of the FT-ineligible group will make E-5 due to the increased demands

Table 5

Supervisor Confidence Ratings of EPICS Personnel and their NSSMS Co-workers

Task Area/Subject Group	N	$\bar{X}^a$	SD	Significance (p)
Clean, inspect, and lubricate:				
EPICS:				
FT-eligible	39	4.0	0.8	
FT-ineligible	36	3.9	1.0	NS
"A" school graduates	23	4.2	0.8	
Remove and replace:				
EPICS:				
FT-eligible	26	2.9	0.8	
FT-ineligible	24	2.7	0.8	.05
"A" school graduates	23	3.4	0.7	
System tests:				
EPICS:				
FT-eligible	39	3.5	1.0	
FT-ineligible	36	3.7	0.9	NS
"A" school graduates	23	4.0	0.8	
Ordnance handling:				
EPICS:				
FT-eligible	29	3.5	1.0	
FT-ineligible	32	3.4	0.8	NS
"A" school graduates	23	3.4	0.9	
System component adjustment:				
EPICS:				
FT-eligible	29	3.1	0.8	
FT-ineligible	29	3.0	0.8	NS
"A" school graduates	22	3.3	0.8	
Operator:				
EPICS:				
FT-eligible	35	3.1	0.7	
FT-ineligible	33	3.1	0.8	NS
"A" school graduates	23	3.4	0.7	
Troubleshooting:				
EPICS:				
FT-eligible	16	2.7	1.0	
FT-ineligible	16	2.4	0.8	NS
"A" school graduates	22	2.4	0.8	

[a]Based on responses to a 5-point scale where 1 = Not at all confident; always requires assistance, and 5 = Extremely confident; never requires assistance.

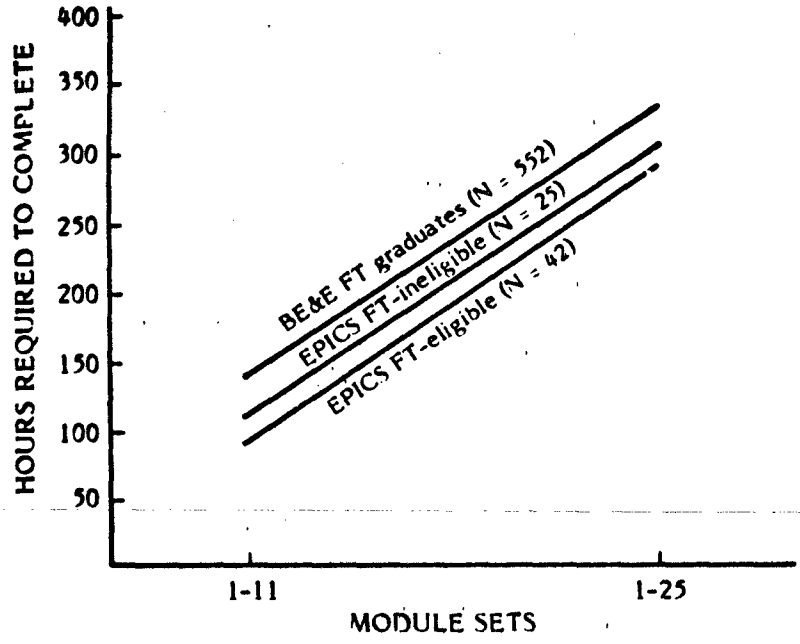


Figure 2. Hours required to complete BE&E module sets for EPICS groups and FT-track BE&E group.

Table 6

EPICS Personnel Advancement

Group	Total	Number at Each Pay Grade			
		E-2	E-3	E-4	E-5
PACFLT:					
FT-eligible	27	2	10	11	4
FT-ineligible	24	6	11	5	2
Subtotal	51	8	21	16	6
LANTFLT:					
FT-eligible	24	0	10	14	1
FT-ineligible	26	0	15	10	0
Subtotal	50	0	25	24	1
Total	101	8	46	40	7

Note. As of June 1983.

for technical learning capacity. Also, they may need to make more attempts to achieve the required test scores. This question cannot be addressed clearly until later in the study.

Shipboard Contribution

The shipboard contribution variable has been broadly conceived as an aggregate measure of time spent on shipboard activities performed during the first 4 years of a individual's enlistment for EPICS, CPS 4-YOs and CPS 6-YOs. This effectiveness measure is conceived as comprising the following 14 primary task areas:

1. Administrative paperwork.
2. Mess cooking.
3. Compartment cleaning.
4. Facilities maintenance.
5. Watchstanding (in port underway).
6. Special sea details.
7. Work parties.
8. Scheduled maintenance.
9. Unscheduled maintenance.
10. Documentation control update.
11. Spares procurement logistics.
12. Supervision (work parties).
13. On-board training (informal).
14. Troubleshooting.

It is being developed so that a relative economic contribution (REC) index, a cost-effectiveness index that contrasts EPICS and CPS with respect to the cost of an individual's direct (on-job) contribution to the operation of a Navy ship at various points throughout his career, can be computed. Figure 3 compares EPICS and CPS (6-YOs) on the percent of relative economic contribution as a function of the first 36 months of service time (hypothetical data). The fact that the CPS path would provide a higher REC upon initial ship assignment than the EPICS path is acknowledged by the difference in origins of the respective curves. The actual shape of the two curves is unknown; however, it is proposed that the two would approach equality around the 24th to 30th month of service. The point being made is dramatized by the area lying between the two curves, which represents the differential economic contribution of the two personnel systems.

To illustrate the shipboard contribution concept on a single dimension basis, the scheduled maintenance variable was selected. Fortunately, reliability, maintainability, and availability (RMA) data for the NSSMS were available for 1787 hours of scheduled maintenance on DD 963 class ships. These data provided necessary scheduling, task performance, and allocation times. Subject matter experts were used to obtain estimates of subject group experience, performance levels, and maintenance scheduling protocols. Scheduled maintenance contribution curves were developed depicting the integration of two relationships: (1) the scheduling protocol of the NSSMS PMS for SPRUANCE-class destroyers, and (2) individual growth profiles representative of EPICS and CPS technicians. The resultant curves, which are shown in Figure 4, indicate the percent of scheduled preventive maintenance for EPICS and CPS 6-YO personnel, as a function of the first 36 months of service. The curves should be interpreted with the following in mind:

1. Contribution is based only on scheduled preventive maintenance.

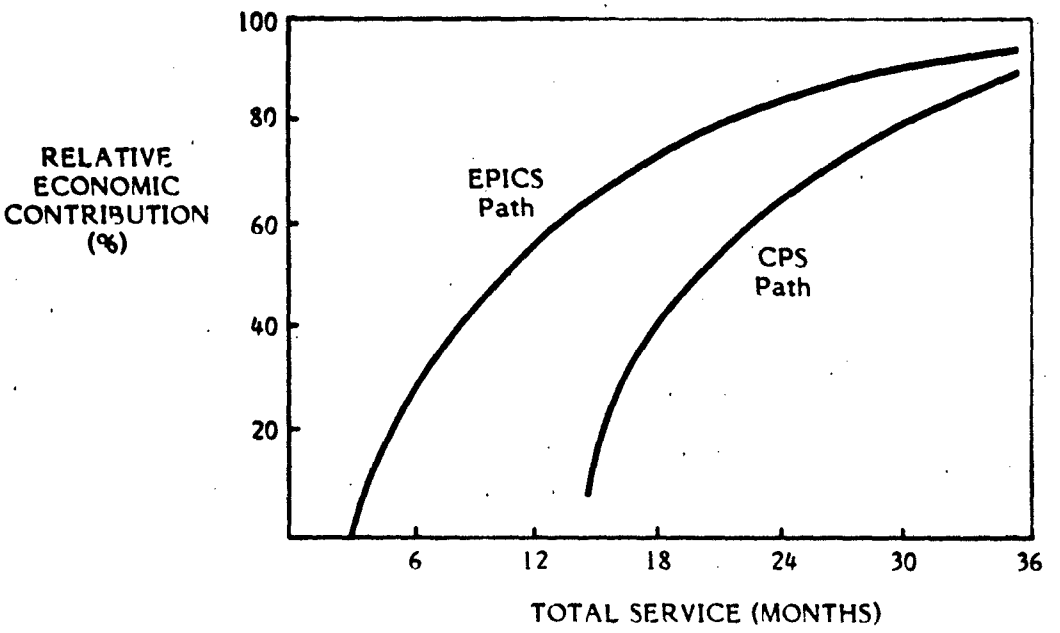


Figure 3. Relative economic contribution for EPICS and CPS paths (hypothetical data).

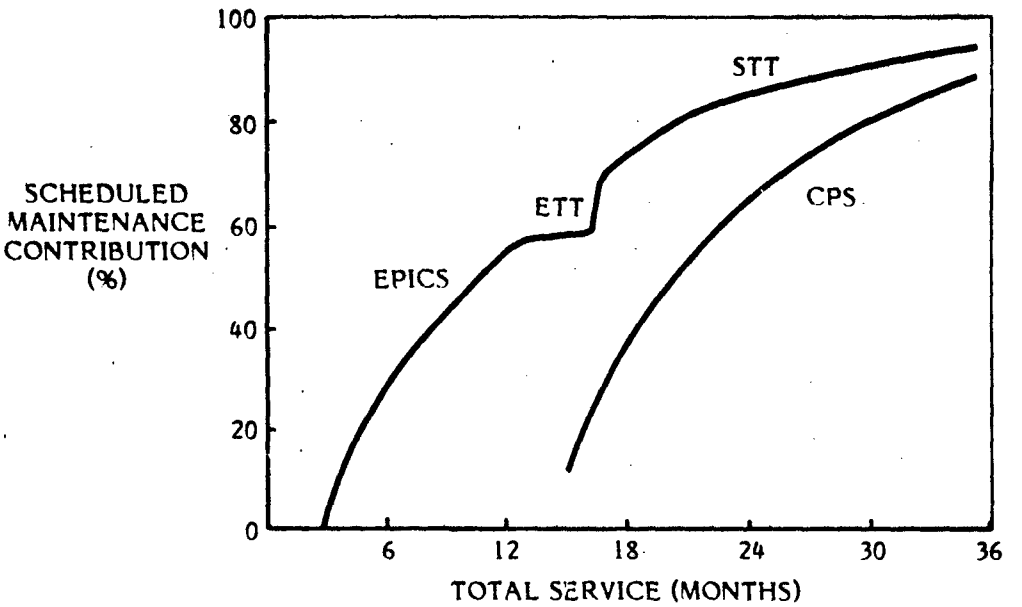


Figure 4. Representative scheduled maintenance contribution for EPICS and CPS.

2. Contribution does not imply a full measure (or utilization) of the potential technical competence of either the EPICS or CPS technicians.

3. The curves do reflect shipboard scheduling of PMS experienced in SPRUANCE-class NSSMS work centers and experience with rate-of-change of the level of work complexity with changing individual competence.

4. CPS 6-YO contribution curves entail relatively quick transition from the elementary work center tasks to unscheduled maintenance, troubleshooting, and administrative tasks.

Findings at this point suggest that, (1) by the end of 10 months, over 50 percent of the PMS man-hours (894 hours) of work may be performed by the EPICS cohort, and (2) the CPS cohort contribution level of 50 percent is attainable at approximately 20 months. The differences in the time required to achieve the 50 percent contribution level are due primarily to the EPICS early assignment to the ship while their CPS contemporaries are attending shore-based schools.

EPICS Program Elements

Enrollment Inducement

Since EPICS candidates were not selected at the recruiting stations, EPICS program inducements could not be contrasted directly with Navy programs offering guaranteed schooling upon graduation from recruit training. However, all of the EPICS FT-eligible group were qualified (assuming school quotas were available) for FT "A" school as well as many other options involving immediate shore-based training. Furthermore, many FT-ineligible group members were eligible for "A" schools associated with other ratings. There was some enrollment competition at the classifier interviews because it was command policy at RTC that all personnel found to be eligible for EPICS should first be offered the option of entering one of the electronics specialities with immediate shore-based training.

The first 20 selectees opting for the EPICS program were interviewed to identify their reasons for selecting the program. These reasons were analyzed and organized into a checklist (with provision for adding other reasons), which was administered to all EPICS selectees during the program debriefing held before they graduated from recruit training. Selectees were asked to check all reasons that applied to them and to indicate whether EPICS was their first choice among Navy programs offered.

As shown in Table 7, the opportunity to work in electronics was the most attractive feature of the EPICS program, followed by its individualized aspect, advancement based on motivation, and the opportunity to gain shipboard experience before attending school. Apparently, many recent high school graduates liked the prospect of at-sea experience with opportunity for technical training in electronics at a later time; continued schooling did not seem to be particularly appealing, whereas immediate assignment to a Navy destroyer or carrier soon to deploy seemed to fit the recruit's expectation of being in the Navy. The prospect of "leave after bootcamp," not available in most other programs at that time, was perceived as important by only 35 percent of the group.

It is interesting to note that 51 percent of the sample indicated that EPICS was not their first choice of the Navy programs offered and 47 percent indicated that it was. Interviews revealed that many recruits had a preconceived but unrealistic notion of

Table 7

EPICS Enrollment Inducement

Item	% of Total (N=137)
1. What aspects of the EPICS program appealed to you most?	
a. Work in electronics	64
b. Self-paced individualized program	56
c. Advancement linked to own motivation	56
d. Shipboard experience before technical school	56
e. Working on a missile system	53
f. Chance to gain skills useful in civilian job	39
g. Leave after bootcamp	35
h. Classroom instruction in electronics	26
2. Was EPICS your first choice among Navy programs offered?	
a. No	51
b. Yes	47
c. No response	2

Note. Data were collected before EPICS personnel graduated from recruit training.

assignments they wanted in the Navy (e.g., as a frogman, parachute jumper, photographer, diver, journalist, etc.), which they later found are very difficult to obtain in recruit training. Others desired programs for which they were qualified but for which openings (quotas) were not then available. In addition, some desired ratings or programs for which they were simply not qualified.

Job Performance Aids

Feedback surveys providing perceptions of fully proceduralized JPAs (FPJPAs) during ATD were returned by 10 of the 34 ESAs and 110 EPICS personnel. Responses to items concerning FPJPAs, which are presented in Table 8, show that, in general, ESAs felt that the FPJPAs somewhat increased their confidence in assigning EPICS personnel to specified tasks at the ATD level and that they could perform those tasks with little help. While they considered FPJPAs as helpful to initial task performance, they felt that those used in ATD were overly simplified (too prescriptive) for EPICS personnel after only minimal experience. Interviews with supervisory personnel indicate the repetitive introductory material presented at the front-end of the JPAs contributed to this perception. Also, they indicated that EPICS personnel use a mix of MRCs and JPAs for scheduled maintenance. Interview data supported this finding and suggested that EPICS personnel quickly transfer to MRCs for frequently occurring PMS.

Table 8

Respondents' Perceptions of Job Performance Aids

Feedback Item	$\bar{X}^a$	s_x
EPICS Shipboard Administrators (N = 10)		
To what extent . . .		
1. Does having JPAs make you more confident in assigning EPICS personnel to certain tasks?	3.0	1.2
2. Do JPAs contain all the information needed to do the job?	3.7	1.3
3. Are you asked to show EPICS personnel how to use JPAs?	2.3	0.8
4. Do you have difficulty obtaining JPAs for your work center?	1.8	0.9
5. Is it necessary to have introductory training in using JPAs?	2.3	1.1
6. Do you have to assist EPICS personnel when they use JPAs?	1.9	1.0
7. Do EPICS personnel use MRCs instead of JPAs when both are available?	3.6	0.7
8. Are the JPAs overly simplified?	4.7	0.7
EPICS Personnel (N = 110)		
To what extent . . .		
1. It is necessary to have introductory training to use JPAs?	1.7	0.9
2. Are JPAs hard to understand?	1.5	0.7
3. Do you need help when using JPAs?	1.6	0.8
4. Would you be satisfied with using JPAs for all work center maintenance?	2.7	1.1
5. Do JPAs contain all the information needed to do the job?	3.8	0.9
6. Are the JPAs correct?	3.5	0.8
7. Would you want to have the help of JPAs if you changed jobs?	3.0	1.1

Note. Feedback surveys were administered to ESAs 6 months after EPICS personnel reported aboard; and to EPICS personnel, after they completed ATD.

[a]Based on responses to a 5-point scale where 1 = very little extent and 5 = very great extent.

The EPICS personnel returning the feedback survey felt that they could use the FPJPAs with only limited introductory training, considered them easy to understand and use without help, and felt that they contained all the information needed to perform the associated tasks correctly. However, they felt that FPJPAs could not be used for all work center maintenance. This finding, coupled with the above observation by ESAs concerning

level of simplication and interview data, suggested that peer pressure in the work group motivates the EPICS personnel to transfer as quickly as possible to MRCs, which were perceived to be the more "acceptable" scheduled maintenance documentation.

Shipboard Instructional Program

Table 9 provides responses to feedback items on the shipboard instructional program. As shown, the ESAs felt that the comprehensive tests were easy to administer and score, they were able to react promptly to requests of EPICS personnel for modules and tests, and they usually had time to answer questions posed by EPICS personnel concerning self-instructional materials. Although ESAs indicated that non-EPICS personnel in the work center used the EPICS modules only "very little," the response variability (SDs) to that item (I.1) suggests that, in some work centers, non-EPICS personnel are using the modules "to some extent." This supposition is supported by interview data, which suggested that such modules were used unofficially for refresher training on certain aspects of the system and as primary instructional aids for school graduates. Items dealing with the physical properties of the modules indicate that they probably did not stand up well under the rigors of shipboard use (paper form) and that the limited storage space on board ship presented a problem.

EPICS personnel indicated that they usually had adequate time to complete the modules at the pace they desired and that they experienced delays in getting their comprehensive tests scored to only a little extent. However, the SD for this item suggests that some EPICS personnel did experience difficulty. This same interpretation can be drawn on the item dealing with noise level of study areas on board ship. Even though the mean response indicated that noise was a problem to a "little" or "to some" extent, the item SD suggests that a number of EPICS personnel had difficulty, in their opinion, in finding a relatively quiet area on board ship in which to do their modules. No doubt, attention and responsiveness of ESAs, as well as opportunities to find what might be considered appropriate study areas, varied across ships and within given ships across time. Finally, EPICS personnel felt that, in general, the instructional modules were not too difficult to understand and that studying the modules often helped them learn skills that were directly applicable to their jobs. This finding provides some assurance of the relevance of the training objectives established for the shipboard instructional program.

Shipboard Administration

An important part of the EPICS T&E concerns shipboard support of the program and the quality of administration and leadership, functions in which ESAs played a vital role. Since ESAs were usually first and second class petty officers assigned as NSSMS work center supervisors, their interest, level of motivation, and leadership ability are important to the work center's overall effectiveness. For the EPICS program, which depends upon a consistent level of shipboard support, the role played by ESAs is even more important.

Direct measures of individual ESA performance were not taken for several reasons. However, data gathered on EPICS personnel questionnaires, reported earlier, provide information on the degree of support realized. Also, reports by EPICS field representatives provide considerable insight into the variability of leadership performance among ESAs.

On ships where ESAs were concerned about personnel development, the EPICS program was administered according to expectations and EPICS personnel progressed through the program completing modules, performing prescribed maintenance duties,

Table 9

Respondents' Perceptions of Shipboard Instructional Program

Selected Feedback Item	$\bar{X}^a$	s_x
ESAs (N = 16)		
To what extent . . .		
1. Do the instructional modules go into enough detail?	3.6	0.9
2. Do the instructional modules become lost, torn, or dirty?	2.5	1.1
3. Do the instructional modules relate well to "hands-on" maintenance tasks?	3.3	0.8
4. Is the amount of study required of EPICS personnel realistic?	3.3	0.9
5. Do non-EPICS personnel in your work center also use EPICS instructional modules?	1.8	1.1
6. Do you have adequate storage space for your modules?	2.4	0.3
7. Are you able to promptly score comprehensive tests?	3.9	0.9
8. Are the comprehensive tests easy to administer and to score?	3.9	1.0
9. Do you have enough time to answer questions of EPICS personnel on their self-instructional materials?	3.6	1.0
EPICS Personnel (N = 110)		
To what extent . . .		
1. Do you have adequate time to complete the instructional modules at your own pace?	3.5	1.0
2. Are you learning job skills from studying the instructional modules on your own?	3.3	0.7
3. Do you experience delays in getting your tests scored?	2.2	1.4
4. Are the instructional modules difficult to read?	1.7	0.7
5. Is your study area too noisy?	2.7	1.2
6. Have the instructional modules helped you prepare for advancement in rate?	3.0	0.8
7. Do the instructional modules help you complete your PQS for the NSSMS?	3.4	0.9
8. Is it clear what you are supposed to learn from the instructional modules?	3.9	0.7

Note. Feedback surveys were administered to ESAs 6 months after EPICS personnel reported aboard; and to EPICS personnel, after they completed ATD.

[a]Based on responses to a 5-point scale where 1 = very little extent and 5 = very great extent.

taking tests, attending shore-based schools in a timely manner, and, sometimes, being reassigned or dropped from the program. Undoubtedly, the business of the entire work center was conducted in much the same effective manner. This environment provided maximum opportunity for both EPICS personnel and regular work group members.

On ships where ESAs were less motivated and concerned or were less adept at leading, there was much less action in executing the program. In these instances, considerably more attention was required by the EPICS field representative. Of course, this type of support was only possible when the ship was available in a CONUS port. Also, poor ESA leadership placed an additional burden on individual EPICS personnel, particularly those who needed a bit more guidance or assistance. The "individual" aspect of EPICS was certainly dramatized in these instances with the need for additional effort, personal discipline, and individual action to obtain modules, get tests scored, and progress as expected by the program.

The fleet representatives observed that a number of EPICS personnel were not self-motivating. Many needed periodic nudges from their ESA to complete the required work. In several instances, peer group pressure operated to draw along an individual who was less than fully committed to module study. This environment served as a self-selection purpose in that the more dedicated, interested subjects were able to progress on their own, whereas those who were easily distracted or found easy rationalizations for not doing the work tended to falter. The point here is that, even on those ships with less than satisfactory ESA support, the program could still function through the individual's effort and intermittent visits by the EPICS field representative. Obviously, responsible, consistent ESA support is much preferred; however, even without that support, the EPICS program can still succeed with self-motivating individuals.

An anecdote related to shipboard work group dynamics that concerns emerging leadership observed on ships with weak ESAs should be noted here. In several instances, other petty officers in the work center (some FTM3s) became interested in the program and in serving the facilitator role. These "volunteers" were acknowledged by the EPICS field representative and the work center supervisor and eventually were assigned the responsibility of ESA. Without exception, these ESAs turned out to be the most dedicated and effective leader administrators of all.

Fleet User Comments

The appendix provides comments on EPICS excerpted from CONARs submitted by COs of 11 ships. In general, most perceptions were positive. However, one CO noted a problem in that EPICS personnel were counted against NMP. EPICS personnel were counted against a ship's NMP for apprentice level (FTM 0000) billets, but not for NSSMS "C" school-trained (NEC 1148) billets. Since it has been demonstrated that EPICS personnel perform competently at apprentice-level billets using JPAs and instructional materials, it appears reasonable to count them against FTM striker billets.

The comments on EPICS quoted in the appendix fall generally into seven categories. These categories are listed and described below.

1. Adaptability to Shipboard Environment. The EPICS program is beneficial to the ship, plays a good supplementary role, should be expanded to other systems, is well formatted for rapid achievement of goals, and is successful in ship environment.

7. Impact on Navy Personnel Problems. The EPICS program promises to relieve shortages, provides immediate technical help, provides opportunity for good selection mechanism, and reduces school training costs.

3. Personnel Qualities. The EPICS program provides highly qualified, highly motivated, well prepared personnel who pass advancement tests.

4. NSSMS Contribution. The EPICS program is fully integrated within the work center and provides exemplary progress.

5. JPAs. Some EPICS JPAs have been used by other NSSMS personnel.

6. Shipboard Materials. EPICS materials have been used for shipboard indoctrination.

7. Formal training (ETT). EPICS program has provided high quality personnel/technicians.

Relative Costs

Megrditchian (1983) compared training and ancillary costs of EPICS and CPS for cohorts of 200 and 500 personnel in terms of net present value (NPV) and equivalent uniform annual cost (EUAC). Table 10, which provides costs for the 500-technician cohort, shows that estimated aggregated costs to develop an individual to the point where he is a qualified FTM/NEC-1148 technician under EPICS are $18,368, compared to $24,659 under CPS. This represents a potential cost avoidance of approximately 26 percent in producing 500 NEC-qualified technicians over a 10-year period or a dollar saving of $3,145,574. Further, if EPICS should be implemented on another system, lessons learned would result in more efficient development and production of JPAs and shipboard instructional modules and could result in savings up to 35 percent or $4,315,340 for the 500-technician group.

Table 3, which provides demographics for the three longitudinal cohorts, shows that 35 percent of the overall EPICS are Category III individuals, compared to 17 percent of the FTM sample. If the net favorable measure is defined as the percent of Mental Group III individuals available for the FTM career path, the following cost effectiveness index (CEI) equations result:

$$\text{EPICS Overall} = \frac{35}{1.4} = 25\% \text{ per million EUAC dollars.}$$

$$\text{CPS} = \frac{17}{1.9} = 9\% \text{ per million EUAC dollars.}$$

The values 1.4 and 1.9 in millions of dollars for EPICS and CPS respectively were taken from the EUAC data in Table 11.

The above CEI values suggest that EPICS may provide nearly a 3-1 advantage in manpower utilization over CPS by being able to make effective use of Category III personnel in an FTM capacity. As stated earlier, however, the real meaning of these effectiveness indices must await the collection of sufficient performance data to determine conclusively the relative on-job performance of the EPICS FTM ineligible cohort.

Table 10

Training and Ancillary Costs of EPICS and CPS for a 500-technician Cohort for a 10-Year Training Horizon

Cost Component	Net Present Value		Equivalent Uniform Annual Cost	
	EPICS	CPS	EPICS	CPS
School:				
Training	$6,917,953	$10,543,746	$1,073,050	$1,635,450
Curriculum	890,327	993,760	138,099	154,193
Instructional modules	414,109	NA	64,233	NA
JPAs/MRCs	824,200	792,037	127,842	122,854
Materials support (admininstration guide)	54,859	NA	8,509	NA
Staff support	82,521	NA	12,800	NA
Aggregate Cost	$9,183,969	$12,329,543	$1,424,533	$1,912,447
Cost per individual	18,368	24,659		

DISCUSSION

As indicated earlier, the EPICS T&E is slightly more than 50 percent completed at this time. Data on variables associated with intermediate outcomes will not be modified with follow-on data (such as attrition from recruit training or performance in ETT) but will be supplemented with findings on other measures in future reports addressing specific EPICS facets. Data on variables that will substantially influence the final assessment of EPICS such as STD job performance measures or overall cost-effectiveness are still being collected or developed.

Considerable planning was conducted to identify variables of interest prior to actual data collection. However, new variables of interest, including a wide variety of relationships that invite analysis and interpretation, continue to emerge primarily because of the systems approach used in EPICS and its longitudinal test approach. Where possible, analyses of these relationships will be included in future reports. Therefore, although findings to date suggest certain trends, final judgment of the various EPICS initiatives must await data collection and analysis of all variables over the complete test period and associated analysis and interpretation. To serve an interim purpose, though, findings to date are discussed with implications for attainment of program objectives.

Personnel Effectiveness

EPICS attrition from the Navy after recruit training has been on a par with CPS attrition. An interesting total attrition (Navy + EPICS program) finding is that the EPICS FT-eligible group appears to be attriting at a slightly higher rate than the FT-ineligible group, especially during recruit training (11 vs. 4%) (Table 5). Data on individuals who attrite from the NEC 1148 track but who are continued in the NSSMS work center as NEC 0000 technicians will be available in the near future. These individuals are still in the EPICS program but not in the primary track to be granted the 1148 NEC (STT graduate).

Comparisons made between EPICS personnel in ETT and a comparable FT-track BE&E group show that those in the EPICS groups completed Modules 1-25 more quickly than did the FT-track group (Figure 2). However, the fact that only 80 percent and 50 percent of the FT-eligible and ineligible groups respectively progressed to this point indicates that ETT serves as a significant academic screening step. Overall ETT performance includes module sets 30 and 40, which may be completed upon return to shipboard duty. Completion data on these module sets are still being collected.

Due to performance in ETT, one might expect that fewer FT-ineligible will qualify for STT than FT-eligibles. However, those who do qualify will likely be successful in STT. EPICS personnel with lower AFQT composites may be effective through the ETD portion of the EPICS program and then may shift to the non-NEC track until the end of their enlistments. The individualized aspect of EPICS allows individuals who can perform a job well at a given level to continue in that position as long as it is beneficial to the Navy.

Advancement-in-rate is an indicator of military progress but is relatively less performance-based than others. Further, it is influenced by such factors as time-in-service eligibility, test-taking opportunity, opportunity for study, test-taking ability, and quotas for specific ratings. Up to the present time, EPICS personnel usually have been taking advancement in rating tests at the first opportunity. They are accustomed to using instructional materials such as the rate training manuals due to the use of STEPS throughout the program. Also, much of the instructional content in the ATD modules is related to knowledge required for the FTM3 examination. Further, the shipboard tracking form for EPICS personnel includes completion of general military requirements necessary to qualify to take the advancement test. At present, there are seven FTM2 petty officers in the EPICS cohort, two of which are of the ineligible group. Advancement in rate in EPICS is facilitated by attending ETT and STT and continuing in the NEC 1148 track. Those that opt for or are assigned to the non-NEC 1148 track will likely have a more difficult time making FTM2 since they will not have the benefit of STT.

Supervisor confidence is an extremely important variable since it relates directly to fleet acceptance of those coming aboard without initial technical training. During shipboard orientation briefings, some supervisors expressed concern that EPICS personnel would not have BE&E and Phase I "A" school training prior to coming aboard. However, as shown in Table 6, which provided ratings of EPICS FT-eligible and FT-ineligible cohorts and Phase I "A" school graduates, differences among the groups were negligible, with all three groups clustered very closely on all task areas assessed. This provides a strong indication that work group supervisors, on the average, perceive both EPICS cohorts as competent as the Phase I "A" school graduate. This is not to say that, given the choice, they would not select an "A" school graduate. However, when the two groups were compared on-the-job, the benefit of 26 weeks of BE&E and "A" school training with respect to the tasks assigned was not demonstrated.

Program Elements

A deferred training program with early at-sea experience appears to be an attractive enrollment inducement to GENDET recruits who enter the Navy without a "guaranteed" program. These individuals, for the most part, are not informed and must make a career decision with minimum information during their classification interview during recruit training. Further, the option of early ship assignment, coupled with work on electronics systems, persuaded 84 FT-eligible candidates to select EPICS rather than the electronics track with school directly out of recruit training. It is hoped that the recruitment potential of EPICS can be tested against other Navy programs at the pre-induction point in the future.

JPAs were intended for use primarily by EPICS personnel at the ATD level (FPJPAs) and, for primarily unscheduled tasks, at the ETD level (PPJPAs). Ideally, EPICS personnel would have been precluded from using MRCs, so that the question of JPA acceptance and aiding effectiveness could be addressed specifically. However, EPICS personnel and their supervisors apparently perceived that it was advantageous to advance as quickly as possible to use of MRCs. Also, EPICS personnel wanted to gain work group acceptance and the status of the "established" technician using standard technical data (MRCs). These objectives can be accomplished as long as EPICS personnel receive sufficient practical job experience (PJE) and on-job training (OJT) and are required to complete the relevant instructional modules to prepare them to perform tasks of greater complexity. This general question is relevant to the concept of performance aiding and career advancement and will be explored carefully as the T&E continues.

Both supervisors and EPICS personnel felt that the FPJPAs were too detailed, with too many introductory illustrations. The question here is whether that level of prescriptiveness was necessary to ensure the desired performance level but was objectionable due to the amount of redundacy in equipment access and close-up. It may be that a less prescriptive format would be sufficient, which would significantly reduce the cost of the JPAs.

The fact that EPICS personnel, for the most part, shifted to MRCs during ATD and performed acceptably thereafter is an argument for reducing the prescriptiveness of the JPAs used in those instances where PJE and shipboard instruction are provided. This notion will be explored further and definitive guidelines noted; however, since the cost of producing JPAs is driven largely by the number of illustrations and level of detail, a shift to more text and fewer illustrations in FPJPAs would increase the margin of overall savings beyond the 30 percent obtained in the cost analysis presented earlier.

The proposition of exporting instruction to the fleet through the use of self-teaching packages (STEPS) is integral to the EPICS concept. Findings to date indicate that it is a viable concept, if properly supported. The use of individual-scored-end-of-module tests with ESA-scored comprehensive tests appears to provide for learning assessment without being unduly burdensome administratively. To date, all STEPS used on EPICS are in paper form, which was the only practicable approach available given available funding. However, paper is bulky, presents storage problems, and often does not stand up well to continual shipboard use. In this study, EPICS STEPS had to remain useable for only one shipboard cadre (4-6). However, in an ongoing program, serious consideration should be given to the use of microcomputer technology as an instructional program delivery vehicle. This computer could also be used jointly with JPAs and provide a multiskill level, technical information/instructional delivery medium.

Some EPICS personnel had a problem in finding time to complete the modules and a reasonably quiet place to work on board ship. To a large extent, the former problem can be aided by the work group leader and the ESA, depending upon the ship's evolutionary state and work load, by providing for study periods. However, the individual may have to give up an occasional liberty period and invest some of his own free time to complete the modules in a reasonable amount of time. Then too, periodic urging from the ESA is likely to be required. EPICS is an individualized program that requires self-discipline and commitment on the part of each individual. Individuals without these attributes are apt to self-select themselves out of the program sooner or later.

The quality of shipboard administration, particularly the level of support and leadership provided by the ESAs, is an important factor in the operation of a system such as EPICS, not to mention its importance to the overall, day-to-day operation of the ship. As would be expected, not all ESAs were supportive or provided the guidance any E-1/2/3 might expect. In some ships, requirements created at higher organizational levels increased the difficulty of executing certain EPICS administrative tasks (e.g., record keeping, requesting quotas for shore-based schools, achieving reasonable equity in the assignment of work parties, providing work group support during periods of mess cooking). In the final analysis, however, the immediate supervisor was the key to the speed of shipboard adaptation of EPICS personnel, as well as their progress through the program. Where such support was lacking, group cohesiveness among EPICS personnel and peer support may have helped to fill that need. In other instances, non-EPICS shipmates would serve as facilitators and provide guidance and support.

The commodity of work center leadership, of course, is perishable and changes almost constantly as a function of enlisted supervisors, ship's officers, ship schedules and evolutions, deployments, etc. Any shipboard program, including EPICS, must be able to contend with variations in quality of shipboard leadership and support. In the EPICS program, fleet representatives at the E-7/8 level were invaluable in identifying those who needed a word of encouragement (with ship's permission) and highly effective at interacting with work center supervisors and ESAs who did not fully understand how important they are to the program. The investment in fleet representatives was repaid by improved work center relations and by the production of competent maintenance technicians who otherwise might have been lost to the Navy or to the NSSMS work center.

Cost Comparisons

Deterministic cost analysis data indicated that a potential 30 percent cost avoidance can be realized with a deferred distributed career system such as EPICS. Initial computation of the personnel resource CEI suggests a 3-to-1 advantage in Category III manpower resource utilization for the FTM rating. These analyses do not yet include personnel effectiveness considerations involving attrition, retention, relative on-job contribution, and other variables that might influence the ultimate cost effectiveness outcome. These variables, among others, will be introduced into the cost equation as the program matures and a broader spectrum of outcome data becomes available.

IMPLICATIONS

It is premature to draw conclusions from the data currently available on EPICS; however, certain implications with respect to R&D thrusts and next steps in application can be noted.

1. Findings to date indicate that most program objectives can be accomplished to varying degrees. EPICS has been working within the shipboard environment and individuals are meeting intermediate goals leading to the final goal of serving as a FTM for the NSSMS in the fleet. Fleet reaction to the EPICS program to date has been positive, with general satisfaction with EPICS personnel performance.

2. At the present time, many EPICS personnel in the T&E study have completed the first half of the program, which contains the greater number of risks. Risk level for the remainder of the program is considerably less. Within the next 6 months, those EPICS personnel remaining can be expected to enter STT with a high expectation that they will ultimately fill FTM NEC-1148 positions in the fleet.

3. Questions about the EPICS program's final cost effectiveness and determination of its generalizability to other systems are often posed by various interested activities. An unequivocal answer must await completion of the entire T&E. Numerous hypotheses remain to be tested, along with the collection of outcome data concerning attrition, reenlistment, and final comparative performance levels in the fleet. However, it can be stated with some assurance that EPICS can be expected to provide the benefits sought if continued on the NSSMS. By maintaining continuity with the current program, a reasonable steady-state condition would prevail that would support resumption of the apprentice technician pipeline from the recruit training commands.

4. One of the more challenging R&D questions remaining concerns the institutionalization of EPICS within the Navy manpower and training system, should that step be desired. At present, there seems to be no mechanism for incorporating an R&D product of this magnitude into the Navy network of agencies that acquire, train, distribute, and manage manpower for the fleets. Evidently, there is no identifiable historic instance in which this has been accomplished for a major program. Therefore, a future objective of the EPICS Project Office is to address this question and to serve in some facilitative capacity to increase assurance that, should the operational Navy wish to take advantage of an R&D innovation such as EPICS, means will be available for responsive action by the Navy's manpower, personnel, and training community.

FUTURE PLANS

EPICS T&E will be continued on a longitudinal basis until data have been gathered on all EPICS personnel and on all program components. Milestones leading to T&E completion are listed below:

1. Complete development of STD shipboard instruction modules and install onboard ship (March 84).

2. Complete STT course at Mare Island for all qualified EPICS personnel (September 84).

3. Complete fleet performance evaluation of all EPICS personnel comparison groups as well as data collection on all personnel and system variables (November 85).

4. Complete data analysis of all personnel and system variables and prepare reporting memoranda (March 86).

5. Complete cost effectiveness analysis illustrating cost benefits and tradeoffs along with computational models (May 86).

6. Submit final reporting documents and end products along with detailed recommendations for utilization of EPICS-like integrated personnel systems along with impact statements on current systems (September 86).

Data are currently being collected on troubleshooting performance of EPICS STT and NSSMS "C" school graduates. These measures are collected when subjects graduate from the respective schools and at two later test points. Results will provide supplementary objective data for appraising the relative proficiency of EPICS personnel at various career points.

A methodological document on the design, development, installation, and administration of an integrated career path such as EPICS will also be proposed. Guidance will be provided for determining the applicability of such systems, along with criteria for assessing system effectiveness.

Finally, the problem of R&D product appraisal and institutionalization, which is complex, not easily solved, and involves most organizational entities composing the Navy's manpower, personnel, and training community, will be addressed. To facilitate the transfer of technology developed by the R&D community to the operational Navy, an organizational mechanism must be defined.

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APPENDIX

EXCERPTS FROM COMMANDING OFFICER NARRATIVE REPORTS

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1. USS JOHN HANCOCK, DD 981

a. 3rd Quarter FY81. "The EPICS program has just been implemented and is too new to evaluate."

b. 4th Quarter FY81. "The EPICS program appears to be a viable way to alleviate the fleet manpower shortage. Although no immediate technical help is gained, the three assigned personnel have accomplished PMS and are willing strikers."

c. 1st Quarter FY82. "The EPICS program has been fully implemented in JOHN HANCOCK. Four EPICS personnel are assigned and are making satisfactory progress."

d. 2nd Quarter FY82. "The EPICS program is progressing well. The trainees are adequate equipment operators capable of conducting much of the required PMS under supervision. One trainee is ready to attend school for subsystem training."

e. 4th Quarter FY82. "The EPICS program is progressing well. One trainee has completed the ETT course and the two remaining trainees have ETT quotas approved."

2. USS RANGER, CV 61

a. 4th Quarter FY81. "Ranger has received onboard five EPICS personnel this quarter to supplement our maintenance personnel."

b. 3rd Quarter FY82. "The EPICS program onboard RANGER for NSSMS has four participating members. They have progressed through the apprentice technician level of training, preparing themselves for ETT school in October 1982."

c. 4th Quarter FY82. "The EPICS program on board RANGER for the NSSMS has four participating members. They have progressed through the first 14 modules of ETT, completing the requirements for ETT school entry in October 1982."

d. 1st Quarter FY83. "EPICS is an excellent program that shows promise of relieving current shortages in trained manoower in a most economical way. Individuals who do not demonstrate sufficient potential for completing anticipated training due either to professional, technical, or disciplinary problems are identified and dropped prior to any formal (technical) training. RANGER currently has four men become coded NSSMS technicians. This program is definitely proving beneficial to USS RANGER."

3. USS THORN, DD 988--4th Quarter FY81. "EPICS students onboard THORN are progressing extremely well. The program is managed at the petty officer level. It is a well-formatted program for both the EPICS coordinator and students, resulting in rapid achievement of goals. EPICS should be expanded to cover the GFCS MK86. The EPICS program is doing well, with one service member having taken the E-4 advancement exam for FTM. He is expected to go to the ETT course in January 1982."

4. USS MOOSBRUGGER, DD 980--1st Quarter FY82. "MOOSBRUGGER has been assigned four FTMSR personnel under the EPICS program in addition to the previous allowance of FTM and GMM NSSMS technicians. These young sailors arrived well-motivated and three of the four are making good progress on the self-study modules and other prerequisites for their first off-ship technical school, which is equivalent to "A"

school. The illustrated job performance aids, MRC cards, and the programmed instructional material supporting this program have enabled these sailors to be productive and effective very quickly. The EPICS program is successful so far, as long as there is a nucleus of fully qualified and schooled FTM technicians to provide training and handle casualties. The only FTM manning problem is lack of experience, with the senior man aboard being a first-term FTM2."

5. USS DEYO, DD 989

a. 1st Quarter FY82. "The EPICS program is doing well. Out of three personnel, one has made third class petty officer prior to any school attendance using the EPICS modules and PO3 and 2 training manuals. One man has been dropped and the third man has advanced according to the guidelines of the program."

b. 2nd Quarter FY82. "The EPICS program continues well, with two service members scheduled for electronics training (ETT) in San Diego in late summer early fall time frame."

c. 3rd Quarter FY82. "The EPICS program has improved with each reporting quarter. A new man has been received bringing our number to three. One member is presently in ETT school, and a second will attend in the near future."

d. 4th Quarter FY82. "The EPICS program continues with one man currently attending ETT school in San Diego and another scheduled for October 1982."

6. USS JOHN RODGERS, DD 983

a. 2nd Quarter FY82. "JOHN RODGERS' two remaining EPICS participants are making satisfactory progress and are expected to be ready for initial offship schooling on completion of our current deployment. EPICS training materials show consistent improvement and the JPAs are widely used by all personnel including NEC-coded technicians."

b. 3rd Quarter FY82. "Manning level is good with all FTM and GMM billets filled including two crewmen enrolled in the EPICS program, both of whom will be attending ETT school next quarter."

c. 4th Quarter FY82. "The two EPICS members of the NSSMS work group are currently away at ETT school and are expected to return in early November. Overall, the EPICS program is running smoothly."

d. 1st Quarter FY83. "The EPICS program got a boost this quarter when the ship's two participants returned from ETT school with a noticeable increase in technical knowledge."

7. USS O'BANNON, DD 987--2nd Quarter FY82. "The EPICS program continues to be a success. Of the four EPICS personnel assigned, two are in school and two are in training on board. Expansion of the program is highly recommended."

8. USS HARRY W. HILL, DD 986--4th Quarter FY82. "More emphasis needs to be placed on putting additional NSSMS technicians in the fleet and on retaining the NSSMS coded techs. Presently, we have three EPICS personnel filling FTM billets and counting against our NMP. On-the-job training is good, but qualified (coded) techs are needed. The

problem with EPICS personnel counting against NMP must be resolved." {Note: EPICS personnel are counted against the ship's NMP for FTM 0000 billets not coded (NEC 1148) billets. In no instance was an EPICS individual placed in a NEC-coded billet indicating a "C" school graduate.}

9. USS INDEPENDENCE, CV 62--4th Quarter FY82. "Manning levels are below normal due to the loss of four EPICS sailors to required schooling (ETT). This will be repeated during the next major deployment with no reliefs as yet identified." {Note: In some instances, it was necessary to assign all four EPICS sailors to a ship at the same time to meet program schedules or manning opportunities. Usually, these groups became separated in time due to differences in individual progress during the first 12 months on board. This comment indicates a case where all four appear to have progressed at the same rate, creating a "clumping" problem.}

10. USS SPRUANCE, DD 963--4th Quarter FY82. "The EPICS program is running effectively with EPICS personnel being fully integrated into the work center. Two EPICS personnel are presently at ETT school. The four EPICS personnel aboard have each achieved enough proficiency that they seldom require the JPA cards when performing PMS."

11. USS FIFE, DD 991--4th Quarter FY82. "The EPICS program has played a vital role in FIFE's missile division. The quality of personnel selected and subsequent training have proven to be outstanding. FIFE has extended the use of EPICS training modules to all division personnel and has incorporated the shipboard indoctrination (SI) modules into the shipwide indoctrination program. EPICS-trained personnel come to the ship better prepared to assume all duties than do their non-EPICS counterparts."

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