Navy Personnel Research and Development Center

San Diego, CA 92152-6800 TN 89-28 July 1989

An Education and Training Strategy for Total Quality Management in the Department of Defense

NPRDC TN 89- 28

July 1989

An Education and Training Strategy for Total Quality Management in the Department of Defense

Carol S. Greebler
J. Gerald Suárez

Reviewed by
Linda M. Doherty

Released by
Laurie A. Broedling
Director, Organizational Systems Department

Navy Personnel Research and Development Center
San Diego, California 92152-6800

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) NPRDC TN 89-28	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION Navy Personnel Research & Development Center 6b. OFFICE SYMBOL (If applicable) Code 16	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) San Diego, CA 92152-6800	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Office of the Under Secretary of Defense for Acquisition 8b. OFFICE SYMBOL (If applicable) (P&L) PS/IPQ	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code) Pentagon, Room 2A318 Washington, DC 20301	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO: PE605119D PROJECT NO: TASK NO: WORK UNIT ACCESSION NO:

11. TITLE (Include Security Classification)
Education and Training Strategy for Total Quality Management in the Department of Defense

12. PERSONAL AUTHOR(S)
Greebler, Carol and Suarez, Gerald

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
Final Report	FROM Mar 89 TO Jun 89	1989 July	55

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Total Quality Management, TQM, education and training, quality, Deming
05	01		

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

The purpose of this strategy is to provide broad guidelines for planning and coordinating a Total Quality Management (TQM) education and training program for the (DoD) work force. The strategy is organized around short-, mid-, and long-range goals. It also describes resources available to DoD training developers and managers who will subsequently be responsible for TQM education and training of their own work forces. Included in this strategy is a description of the educational requirements for a TQM awareness program directed at senior-level and mid-level managers. A methodology for training development is also proposed.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION Unclassified
22a. NAME OF RESPONSIBLE INDIVIDUAL Carol Greebler	22b. TELEPHONE (Include Area Code) (619) 553-7979 22c. OFFICE SYMBOL Code 162

DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted
All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

FOREWORD

This report describes a strategy for educating the Department of Defense (DoD) work force in Total Quality Management (TQM). TQM is a management philosophy that has been embraced by DoD as the best method by which to improve quality, thereby increasing productivity and reducing costs. DoD has created a master plan for the implementation of TQM which includes short-, mid-, and long-range goals. The educational strategy described in this report identifies similar goals for educating and training the work force in TQM.

This effort was conducted under the project *TQM Education Design for the DoD* sponsored by the Office of the Assistant Secretary of Defense for Production and Logistics (TQM/IPQ). It is to be used as a general guide for developing detailed implementation plans concerned with education and training.

Point of contact at the Navy Personnel Research and Development Center concerning this report is Mr. Tracy Pope, Acquisition Management Division Head, (619) 553-7979 or AUTOVON 553-7979.

LAURIE A. BROEDLING
Director
Organizational Systems Department

SUMMARY

PURPOSE

The purpose of this strategy is to provide broad guidelines for planning and coordinating a Total Quality Management (TQM) education and training program for the Department of Defense (DoD) work force.[1] Part of the strategy is to capitalize on the TQM training resources (courses, instructors, etc.) already in place within DoD. TQM capabilities which have been developed within the DoD logistics system can be transferred to non-logistics areas in DoD, to be supplemented with resources external to DoD.

OBJECTIVES

This strategy has two objectives. The first is to describe the educational requirements for a TQM awareness program for managers that provides them with an overview of TQM principles and concepts. The second is to describe program goals, guidelines, and resources available to DoD training developers and managers who will subsequently be responsible for follow-on education and training of their subordinates.

BACKGROUND

The Office of the Secretary of Defense has created a master plan for the implementation of TQM in DoD. Central to this implementation is an integrated education and training program for the work force beginning with and concentrating on senior management. Education in this context is that portion of the program concerned with the teaching of TQM principles and concepts. Training concerns the learning of skills and methodologies used in the application of TQM. The intent of this program is to institutionalize TQM within organizations through a continuing cycle of TQM education, training, and on-the-job applications.

The use of TQM began in DoD in the early 1980s in a few DoD logistic field activities. In 1987 its use began to rapidly expand with the advent of support from senior management. TQM is now one of the DoD's primary initiatives.

VISION AND GOALS

The vision for TQM education within DoD encompasses an education and training system that will be continually improving to meet the changing needs of the work force. Short-, mid-, and long-range goals have been developed that will contribute to the successful institutionalization of TQM in DoD.

Short-Range Goals:

Following development of a DoD TQM education and training strategy, other detailed plans will be developed that address training of course developers, facilitators, statistical specialists, and TQM coordinators. A DoD TQM resource center will be designed and a survey conducted to assess TQM training resources in both the public and private sectors. A cadre of TQM facilitators will be trained to assist with management teams and awareness programs.

---

[1]Services and DoD agencies will have responsibility for developing their own implementation plans.

Mid-Range Goals:

A critical mass of managers will be trained in TQM. Managers responsible for major programs and activities will receive extensive education.

TQM will be integrated into ongoing curricula in DoD schools and into existing career development channels.

The training program for TQM instructors, facilitators, and statistical experts will be in place. Continuing education packages will be developed and distributed for broad use, with course developers concentrating on programs for specific applications. Those involved in design, delivery, and evaluation of education will use TQM methodology to facilitate their work and to ensure quality programs. A TQM resource center will be in operation.

Long-Range Goals:

The process of educating DoD personnel in TQM will be in place, with the majority of the work force trained. TQM will be integrated into all appropriate DoD management and technical education and training courses. DoD will have a support network of resources and communications both internal and external to DoD. DoD will encourage private and public educational systems to provide TQM-related courses.

DISCUSSION

An effective TQM education and training program should cover (1) quality awareness and TQM philosophy, (2) quantitative methods to analyze processes, (3) group development skills, such as team building, and (4) knowledge about how to change organizational culture and overcome obstacles to implementing TQM.

Eventually the entire DoD work force must be trained. However, initial emphasis should be put on training a critical mass. This includes (1) personnel coordinating TQM implementation, (2) education developers and future facilitators and instructors of TQM, and (3) senior- and mid-level managers.

Successful TQM implementation requires continuing education and training. Follow-on training needs to be tailored to specific jobs and organizations and should be determined after an organizational needs analysis is conducted and objectives established. Needs analyses of different subgroups (hierarchical and functional) help to identify specific training requirements and optimal content and delivery methods. Special training courses for persons who will be assigned as TQM statisticians or coordinators for TQM efforts within organizations are needed.

In curriculum development, several issues should be considered, such as adapting materials to different learning styles and testing and evaluating prototype courses. These tasks should be assigned to education development specialists in the DoD schools or commands who have TQM expertise.

Delivery of TQM education should be provided within the current infrastructure as much as possible to ensure consistency in presentation and to provide education tailored to specific DoD applications. This method will also be cost-effective. Potential delivery sources for TQM education include DoD schools, other organizations within the federal government, state and local governments, academic institutions, and the private sector (e.g., consultants, learning institutes).

A DoD resource center is also necessary for an effective education and training program. The resource center should serve as a support network for resource materials and be a communication link to organizations both internal and external to DoD.

RECOMMENDATIONS

The Defense Council on Integrity and Management Improvement (DCIMI) will be responsible for determining which committees and/or boards will carry out the following recommended actions:

1. Development of a management infrastructure for the DoD TQM education and training program.
    - The DCIMI will establish within DoD an education and training QMB (Quality Management Board), which will include DoD education and training specialists, managers, and TQM experts.
    - The QMB members will receive ongoing TQM education by a facilitator/instructor.
    - The QMB will review the DoD TQM education and training strategy and begin drafting action plans.
    - The QMB will be responsible for identifying requirements for all DoD TQM education and training. Government TQM experts (contractor, if necessary) will be appointed or hired.
2. Identification of issues related to funding TQM education. Programming and budgeting actions should be taken where necessary.
3. Identification of TQM educational resources internal and external to DoD.
4. Development of programs for (a) course developers, (b) instructors, (c) facilitators, (d) evaluators, (e) TQM coordinators, and (f) statisticians. Existing awareness and training programs will be used initially (e.g., those available through the Navy Personnel Research and Development Center, consultants, the Defense Systems Management College).
5. Design of awareness courses that include basic philosophy and principles, statistical thinking, basic process analysis methods, group development skills, and knowledge about changing organizational culture.
6. Determination of delivery agents and locations.
7. Presentation of awareness courses; modification, packaging, and distribution of them.
8. Development of TQM follow-on training programs designed to meet special needs of organizations.
9. Evaluation of methodology for both individual courses and the overall TQM education program.
10. Establishment of a TQM resource center for distributing educational materials.
11. Encouragement of public and private educational systems to integrate TQM curricula into their academic programs so that graduates will be knowledgeable about TQM.

12. Integration of TQM education and training into the career development of DoD employees.

13. Initiation and support of research programs on how best to educate and train the work force, particularly management, in the philosophy and application of TQM.

CONTENTS

LIST OF FIGURES

I. PURPOSE

The purpose of this strategy is to provide broad guidelines for planning and coordinating a Total Quality Management (TQM) education and training program for the DoD work force. This strategy is an evolving process that will be modified as needed. The initial emphasis is on senior managers, although successful implementation of TQM will ultimately require educating and training the entire work force. Part of the strategy is to capitalize on the TQM training resources already in place within DoD. TQM capabilities developed for the DoD logistics system can be transferred to other DoD areas, supplemented with resources external to DoD.

This document has two objectives. The first is to describe the educational requirements for a TQM awareness program for managers that provides them with an overview of TQM principles and concepts. The second is to describe program goals, guidelines, and resources available to DoD managers and training developers who will subsequently be responsible for follow-on education and training of their subordinates.

II. BACKGROUND

A. Initial Efforts in TQM

Under the authority of Mr. Frank Carlucci, former Secretary of Defense, a master plan for the implementation of TQM was created. By definition, TQM is the application of quantitative methods and human resources to assess and improve (1) the materials and services supplied to an organization, (2) all the significant processes within that organization, and (3) the degree to which the needs of the customer are being met, now and in the future. For DoD, TQM is a strategy for continuously improving performance at every level. By improving quality, costs are reduced and schedule and mission needs met.

Within this overall effort, Dr. Robert Costello, former Under Secretary of Defense for Acquisition, and his staff initiated an effort to implement TQM in DoD, with early efforts to be undertaken within the acquisition community. Dr. Costello stated that two of his agenda items included the use of TQM to (1) improve the effectiveness of the work force, and (2) improve product quality and reduce cost. Central to meeting these goals is the implementation of an integrated education and training program designed to promulgate TQM principles throughout DoD.

TQM is not new to DoD. TQM efforts began in the early 1980s in a few field activities. Since then, many more applications have begun. While most have involved logistics activities rather than acquisition ones, a considerable TQM experience base has been amassed. This base includes people trained as instructors and facilitators as well as courses and programs available both internally and through consultants.

The Policy Guidance Council (PGC) within DoD has designated the Defense Systems Management College (DSMC) as leader in designing and implementing TQM education for the DoD acquisition work force. The DSMC has developed two courses for managers--a 2-day Total Quality Management Seminar and a 5-day Total Management Course. These courses will provide valuable input for subsequent course design.

Awareness education of senior managers in DoD began in May 1988, when a 4-day Deming Seminar was conducted for over 400 senior DoD managers. Another is scheduled for January 1990. A senior management TQM orientation attended by over 50 senior managers in DoD was conducted in August 1988. A 2-day TQM awareness program was given in February 1989 to members of the Defense Acquisition Board (DAB) (which functions as the Executive Steering Committee [ESC] for all of acquisition) and members of the Office of the Assistant Secretary of Defense (OASD) for

Production and Logistics (P&L) Committee which has been tasked with developing policy and guidelines for initiating the TQM effort in DoD.

A 2-day TQM awareness program is planned for the summer of 1989 for members of the Defense Council on Integrity and Management Improvement (DCIMI) and new members of the DAB. The DCIMI has been given the charter for providing top management guidance for TQM implementation for all of DoD and will serve as the ESC for all of DoD. Possible future events include DoD quality and productivity conferences and an awareness seminar to be given to the heads of the DoD schools.

B. General Guidelines for an Effective TQM Education and Training Program

1. Flexibility

The implementation of a TQM education and training program should be highly flexible and tailored to particular organizational cultures. There is no blanket prescription for applying TQM to all organizations and situations. The responsibility of the Secretary of Defense is to issue broad policy, but the individual Services and Defense agencies must decide on the details of their respective education and training programs.

2. Top-Down Commitment

Commitment must be top-down. This means that senior management should participate actively in its implementation from the beginning. It is management's behavior that will establish the necessary organizational climate that will bring about the resulting commitment of the work force. Because of this unique role that managers will play as change agents, their training should include information on how to institutionalize TQM within their organizations.

3. Continuing Cycle of Education

Implementation of TQM and the education and training of the entire work force are inseparable processes. A comprehensive educational program includes a continuing cycle of TQM education, training, and on-the-job application. Education in this context refers to knowledge and conceptual learning; training refers to those skills and methodologies needed for process improvement. In most cases, TQM education will involve some re-education, that is, changing current management practices, attitudes, and beliefs about quality, as well as ideas about managing people and organizations. All TQM education and training courses must include assignments to be performed back on the job. Those assignments will become the initial actions leading to implementation. Follow-on education is necessary as a vehicle for feedback, for obtaining new information, and for evaluation.

4. Broad Focus

An effective TQM education and training program should cover (a) quality awareness and TQM philosophy, (b) quantitative methods to analyze process, (c) group development skills, such as team building and effective communication, and (d) knowledge about changing organizational culture and overcoming obstacles to implementing TQM.

The development of quality awareness requires that the cultural climate and the attitudes of the entire work force be "quality first." Securing this mind set requires an understanding of the processes in which one is involved. This, in turn, involves both systems thinking and statistical thinking. Systems thinking demands that individuals have a view of their organization that includes processes and people, from supplier to customer. Statistical thinking involves an understanding that all processes have a natural variation and an understanding of the implications of reducing variation to improve the process. Education for quality awareness should also include guidance in the

development of an organizational philosophy of TQM. It is this philosophy that will guide managers in formulating new organizational goals.

One issue that seems to be misunderstood by many people is the relationship of the statistical tools to the broad concept of TQM. Some organizations appear to focus primarily, if not exclusively, on these tools. Research conducted on implementation of TQM has shown that an emphasis on teaching and applying the statistical tools without a management commitment to quality and an organizational climate of teamwork decreases the probability of success (Cocheu, 1989; Scholtes & Hacquebord, 1988). A method for analyzing and improving processes needs to be integrated with the statistical tools so that managers understand the major roles they have in quality improvement. One appropriate model, based on Walter Shewhart's "Plan-Do-Check-Act" (PDCA) cycle (Deming, 1986), would be the process improvement model developed by the Navy Personnel Research and Development Center (Houston & Dockstader, 1988). Ideally, training should be provided "just-in-time" to give people the skills they need as they start using TQM methods in a team setting. (A list of tools and methods along with general topics addressing quality improvement is provided in Appendix A.)

Trust, communication, and cooperation are necessary for effective team functioning. Training for effective communication includes understanding intentions and effects of communication. Active listening is also a useful tool. Therefore, group development skills such as team building and effective communication should be integrated into the education and training program.

Managers are responsible for creating an organizational culture of communication, trust, and cooperation, and overcoming obstacles to implementing TQM. Dr. Deming cites some of these obstacles in his "14 Principles," "Deadly Diseases," and "Obstacles" (Deming, 1986, pp. 23-24, 97-126, 126-146, respectively). Knowledge and tools needed for changing organizational culture and removing obstacles should be integrated into the education and training program (Metz, 1984).

5. Other Considerations

a. Turnover of Top Management

Within DoD, considerable turnover exists within top management. The high rate of turnover is due to (1) changes in political appointees, (2) routine changes in tours of duty for military and senior civilians, and (3) reorganizations. While it is important that this mobile sector of the work force drive the TQM educational effort, it is equally important to identify and train those senior managers whose positions are more stable. Targeting those within the work force who have the greatest influence on others is also essential. Such individuals should be selected for initial training and represent a cross-section of the entire work force.

b. Education of Supplier and Customer

TQM involves bringing both supplier and customer into a formal relationship with the organization. Development of a process to accomplish this should be considered in the education and training plan. This can be accomplished by having supplier and customer quality seminars and/or by including representatives of these constituencies in the education and training of the DoD work force. Another method is to share resource materials and course curricula.

c. Cost

There are limited resources available for education and training. The costs for developing and administering courses and for the training and paying of instructors will be highest during the first few years. With a constrained budget, a strategy is needed for using available resources, which may involve coordination efforts within all of DoD as well as with other branches of government and the private sector.

d. Delivery

There are two ways to develop and deliver TQM education. The first is to create new mechanisms, such as new courses, schools, or career paths. The second is to use existing mechanisms and to modify them. DoD has a vast infrastructure of courses, schools, and training facilities and career paths which can be used to develop and deliver training. In general, the existing infrastructure should be considered first in the interest of cost-effectiveness. Only when the existing mechanisms don't suffice should new ones be created. Delivery issues are discussed at length in Section VII.

III. VISION AND GOALS

The vision for TQM education within DoD encompasses an education and training system that will be continually improving to meet the changing needs of the work force. In support of that vision, education and training goals were developed that reflect the overall DoD goals for implementing and sustaining TQM. Figures 1a through 1e display the overall TQM vision, the long-range goals, and supporting short- and mid-range goals. These long-range goals address the significant milestones that represent the mature application of TQM. The broad set of activities needed to be accomplished at short- and mid-time frames to meet the long-range goals are likewise described. One of the most important short-range goals is to conduct a survey of what training and education resources are already available, both inside and outside DoD, to avoid duplication.

IV. MANAGEMENT INFRASTRUCTURE FOR TQM EDUCATION AND TRAINING PROGRAM

The role of DoD in TQM education and training is to establish guidelines and policy for TQM and to coordinate its efforts with those of the individual Services and DoD agencies. The purposes of the coordination are to promote a common understanding among these units of the principles and practices of TQM and how they can best be conveyed in the classroom and on the job. The role of the individual Services and DoD agencies is to develop their own training plans and to initiate training of their work forces, coordinating their organizational strategies and resources with those of DoD.

The DCIMI will function as the Executive Steering Committee (ESC) for DoD. The DAB will function as the ESC for the acquisition system. The DoD's Quality Management Board for Education and Training (QMB E&T) will be established under the DCIMI. In addition, each Service will establish its own QMB E&T to plan and implement similar education programs.

The DoD QMB E&T will establish policy and guidelines and serve as a coordinating body. It should consist of members of the OSD staff, a representative from each Service QMB E&T, educational representatives from the major defense agencies, representatives from the DoD colleges designated to coordinate TQM education, and the primary developers and providers of education and training. Inter-Service coordination will be achieved by creating a "linking pin"

structure (e.g., having one representative from each of the Service QMB E&Ts serve on the DoD QMB E&T). Initially, the DCIMI, QMBs, and staff personnel should consider use of experts/consultants from DoD and the private sector to provide guidance. These experts, once identified, should serve as facilitators and also educate and train TQM management personnel.

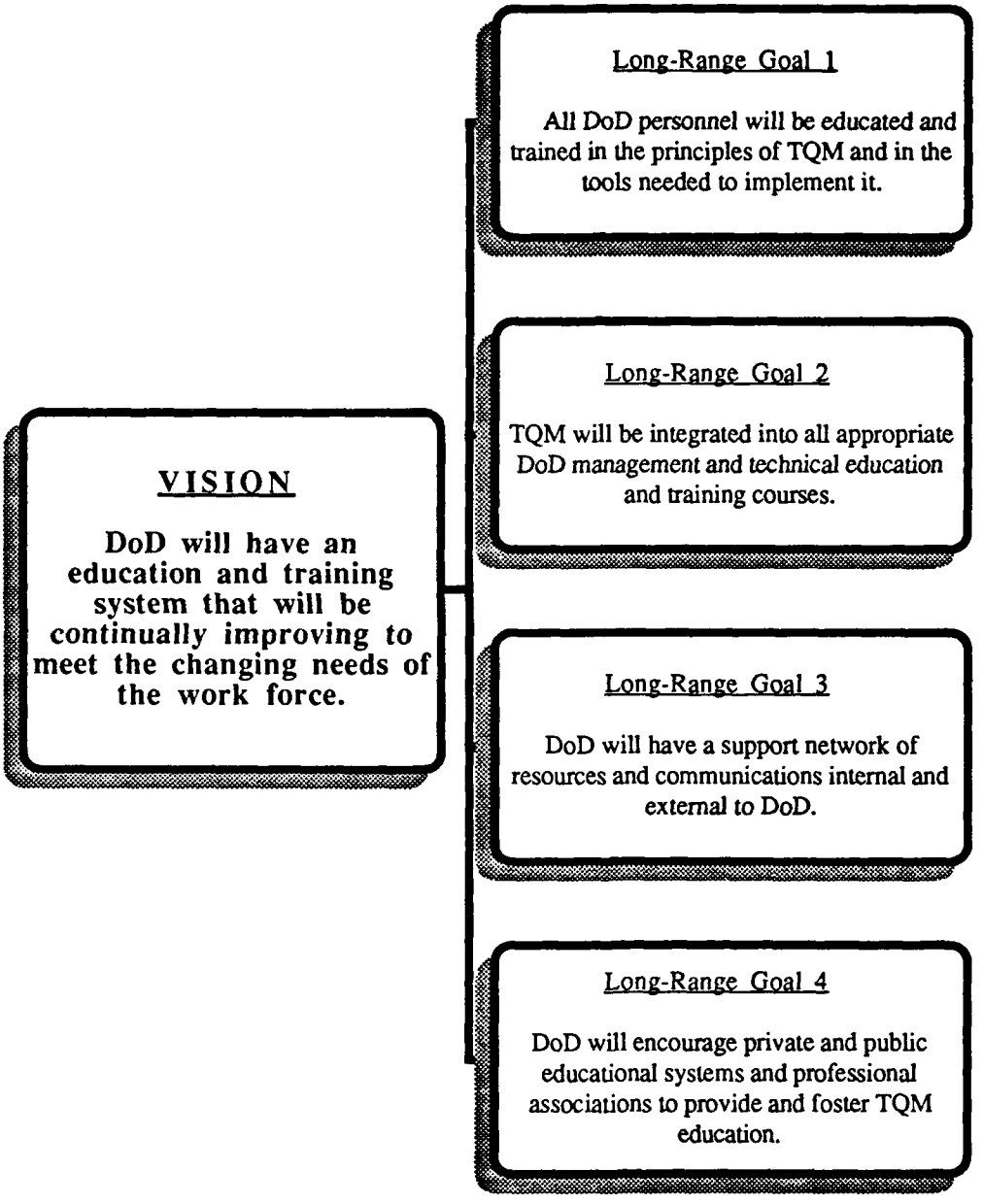

Figure 1a. Vision and long-range goals.

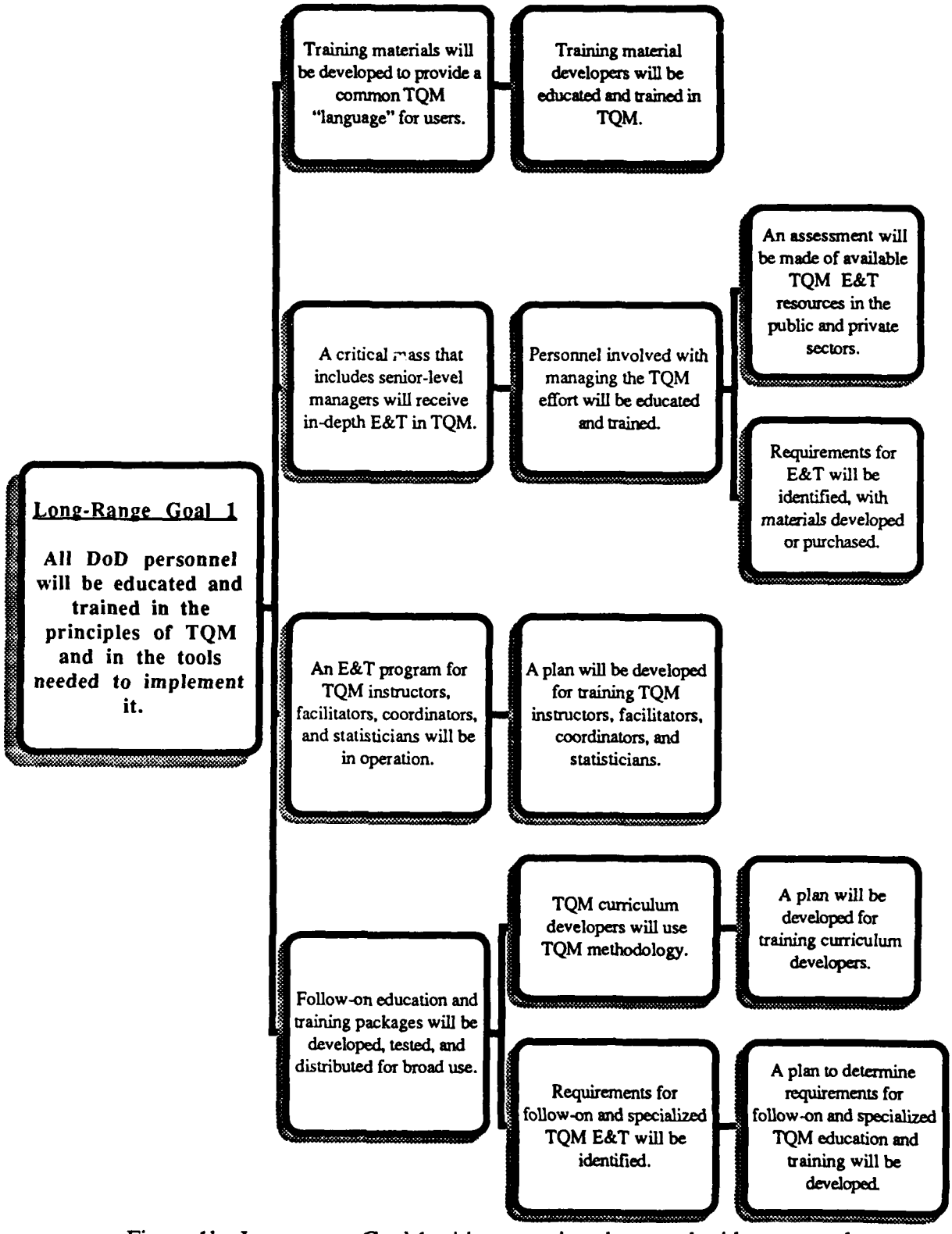

Figure 1b. Long-range Goal 1 with supporting short- and mid-range goals.

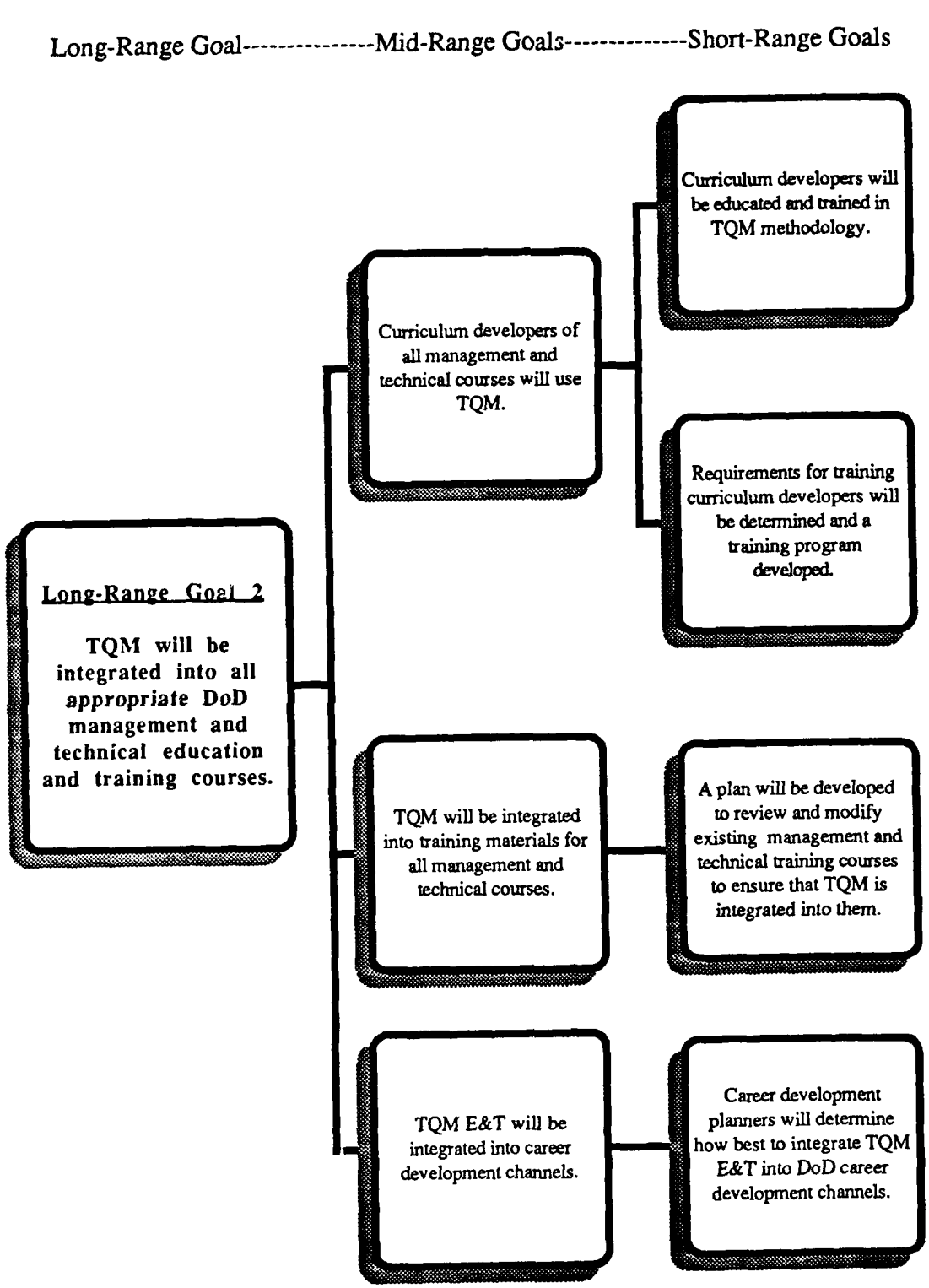

Figure 1c. Long-range Goal 2 with supporting short- and mid-range goals.

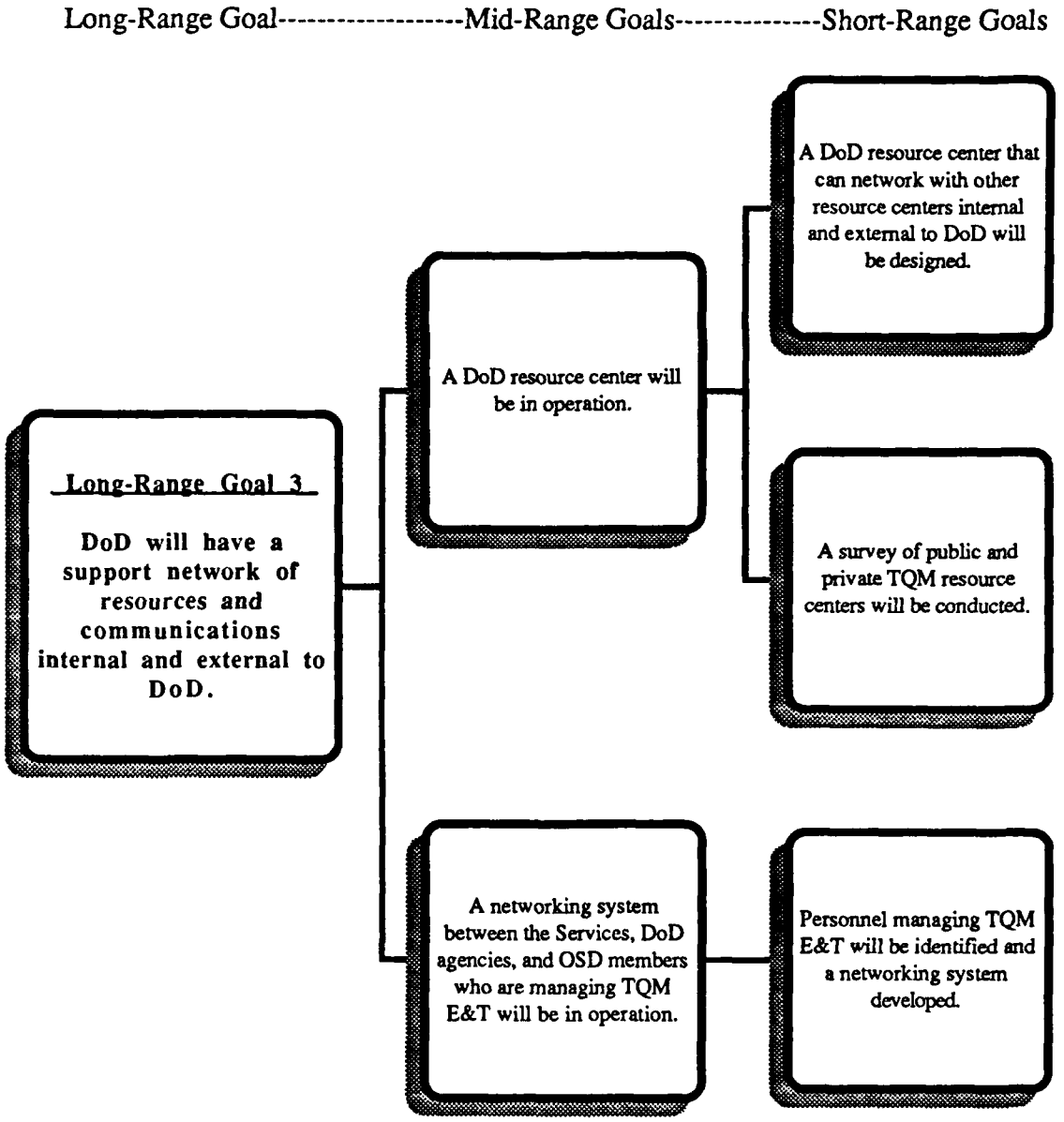

Figure 1d. Long-range Goal 3 with supporting short- and mid-range goals.

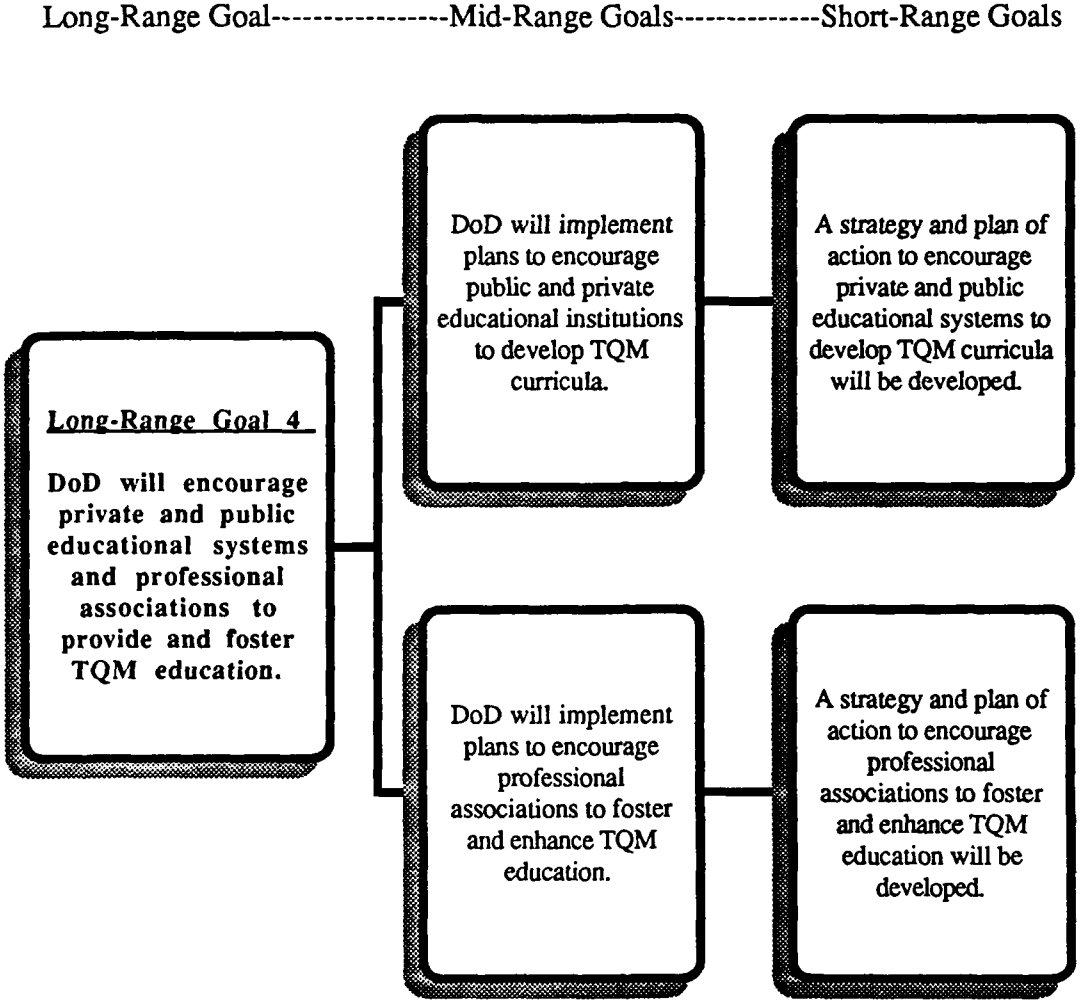

Figure 1e. Long-range Goal 4 with supporting short- and mid-range goals.

V. PROPOSED MANAGEMENT AWARENESS COURSES

Descriptions of a recommended two-day senior management course and a two-part, eight-day general management course are provided in Appendices B and C. Although the two-day course is a vehicle for reaching senior managers, the eight-day course is strongly recommended for all managers. The two-day course provides senior managers with a brief overview of TQM, a definition of their roles in TQM, and some action items, including the need for follow-on education of themselves and their subordinates. A brief discussion of issues relating to the education of senior managers in the DoD is provided in Appendix D.

The eight-day course is applicable to all managers although the initial participants should be senior managers. The eight-day course can be taken without attending the two-day course. The course is divided into a five-day and three-day session. The interval between sessions is called the "back to work" period. The purpose of the split course is to provide opportunities for application of TQM principles to "real world" settings. The focus of the eight-day course is to provide managers with experiential activities covering the four major areas of concern in educating and training their

work forces in TQM: (a) quality awareness and TQM philosophy, (b) quantitative methods to analyze processes, (c) group development skills, and (d) knowledge about changing organizational culture and overcoming obstacles to implementing TQM.

VI. PROGRAM DESIGN AND DEVELOPMENT

A. Population

1. Who Should be Trained?

Successful TQM implementation involves education and training of the entire work force. However, the emphasis of this strategy is on senior and mid-managers. The population addressed in this plan includes (a) personnel coordinating the TQM implementation, (b) course developers and future facilitators and instructors of TQM, and (c) senior and mid-managers. Managers within this population who can provide guidance on who should be trained need to be identified.

While the designated population for this strategy is made up of DoD managers, consideration should also be given to facilitating TQM education of people outside DoD who heavily influence DoD policy, regulations, and funding. This would include members of Congress who serve on the Armed Services and Appropriation Committees and their staffs.

2. Where are They Currently Located?

Many management personnel targeted for training are located in DoD headquarters activities in the Washington, DC area. However, many others are located across the country and around the world. An analysis of these locations must be performed to identify optimal training facilities. Coordination with DoD schools and various shore establishments providing training is also needed. To educate and train the operational fleet, courses will need to be taught at overseas bases and on Navy ships.

3. In What Order Should They be Trained?

The first people to be trained should be those responsible for managing and implementing the TQM effort (e.g., the DCIMI and QMB members). The second group should be those developing, delivering, and evaluating education (e.g., curriculum developers, facilitators, and instructors). These groups must have special TQM training in integrating TQM concepts and methodology with specific job or process requirements. Most DoD organizations are too large to educate all personnel during the initial phase of training. By selecting groups of high-level managers, it will be possible to initiate pilot process improvements which can be used as models for future education.

Determination of which managers should be trained first must be made. This decision will be the responsibility of the individual Services and DoD agencies. However, the initial thrust of the education should be directed toward senior managers responsible for major commands and large acquisition programs or contracting facilities. These include program executive officers (PEOs) and major program and project managers, particularly materiel professionals. Some of the initial acquisition organizations to receive TQM education should be the systems command headquarters, NAVPROs (Navy Plant Representative Offices), AFPROs (Air Force Plant Representative Offices), and ARPROs (Army Plant Representative Offices), Defense Logistics Agency Headquarters, and major field activities such as DCASRs (Defense Contract Administration Services Regions), as well as field contracting organizations.

All managers, particularly acquisition managers, responsible for multifunctional organizations should receive TQM education as members of cross-functional groups, which can also include representatives from program management, procurement, finance, logistics, manpower,

engineering, T&E, etc. One reason for this recommendation is that major processes flow across one or more of these functional areas. Continuous improvement will, therefore, require a cross-functional team effort in which all members have the same basic education. Another reason is that members from acquisition functions play a role in writing and monitoring contracts and will ultimately be involved in evaluating contractor TQM activity. Exposure to the same TQM information will enable all acquisition personnel to interact with contractors in a consistent manner.

A survey to assess the readiness of organizational units may be useful in determining where training should be initiated. TQM education should be initiated in those organizational units where it is most likely to succeed. It is possible to predict potential success in particular organizational units. Factors to consider include (a) top management motivation and commitment to implementing TQM, (b) the stability of senior management in terms of providing continuity of education and training, (c) an organization with open communication and high trust in management, (d) capabilities for follow-on training, (e) the influence and span of authority of leaders to ensure program continuity and momentum, and (f) previous history of coordination and cooperation with other organizations.

B. Student Learning Styles and Instructional Methods

In curriculum development, several issues should be considered, such as adapting materials to different learning styles and testing and evaluating prototype courses. A discussion of student learning styles and instructional methods for TQM education is provided in Appendix E. Development and distribution of course materials are discussed in Appendix F. The development of TQM implementation case studies is recommended.

C. Curriculum Modules

A modular course format is recommended for the eight-day course as well as for all follow-on courses. This allows for re-organizing the format and selecting content areas most relevant for a particular population.

D. Prototype Courses: Test, Review, Evaluate

Once the model programs have been developed, they must be tested. Evaluation should be based on predetermined criteria and a feedback process. Based on the results of the evaluation, programs may be modified. Once the courses are completed, they should be packaged for distribution. Potential users of educational packages include DoD schools, training facilities and resource centers, contractors, and the defense industry to use in developing their own courses. This sharing helps ensure compatibility between DoD and defense industry education.

E. Criteria For Course Evaluation

Courses will be developed by more than one source. Criteria for evaluating course effectiveness need to be developed. This should be done by the same organization responsible for developing course objectives. Similar course evaluation schemes will ensure consistency across delivery systems.

F. Prerequisites, Waivers, and Equivalencies

Prerequisites, waiver requirements, and course equivalencies must be identified to integrate prior training and ensure coordination across different schools and activities.

VII. DELIVERY ISSUES

A. TQM Instructors

DoD must focus efforts on developing instructors with background in both TQM and training expertise. One approach to this problem would be to develop a special TQM instructor training program. Some instructors may teach only a few courses, requiring in-depth knowledge of a limited number of subject areas. Others may teach a range of courses requiring more extensive training. A comprehensive instructor training program should include in-depth education in quality awareness and TQM philosophy, statistical methods and how to apply them to solve practical problems and improve processes, group development skills, TQM implementation, organizational structure and culture, overcoming obstacles to implementing TQM, and management's role in TQM. The program should also include methods of instruction and presentation. An instructor training program should take from 3 to 9 weeks to complete, depending on the type of courses the instructor will be teaching.

Instructors for the on-site courses should be selected from personnel who are respected leaders in their professions, as evidenced by peers and superiors alike. They should have distinguished performance records, have good communication skills, and a strong desire to teach. Preferably, they should have some experience in the theory and application of TQM principles. Initially much of this staff will be made up of people in DoD who already have experience and knowledge in TQM, many of whom are affiliated with DoD field activities. Outside contractors should be used to supplement their efforts.

A search should be conducted to identify people with TQM, statistics, and organizational development experience as potential candidates for instructors and facilitators. As more DoD components gain useful TQM experience and learning, a pool of uniformed and civilian expert practitioners and trainers should emerge.

Education in TQM should include technical information as well as group development skills such as team building, effective communication, and group problem solving. It is important that the instructors integrate courses concerned with team skills with information about TQM philosophy and practices. There are currently programs offered in the private and public sectors covering these skills, but if off-the-shelf courses are used, they should be taught in a way that applies to TQM. Experience in how to integrate interpersonal skills training with training in TQM is lacking and needs to be addressed by the research community.

B. Delivery Agents of TQM Education

Delivery of TQM education should be provided within the current infrastructure as much as possible to ensure integrity, consistency, and applicability of TQM to DoD. Use of existing infrastructures will also keep costs down. Potential delivery sources for TQM education fall into four categories (see Figure 2): (1) those internal to DoD, (2) federal government agencies other than DoD, (3) state and local government and academic institutions, and (4) the private sector.

The first represents organizations internal to DoD, such as DoD schools; the second consists of organizations within the federal government, but outside of DoD; the third is made up of state and local government and academic institutions; and the fourth is the private sector.

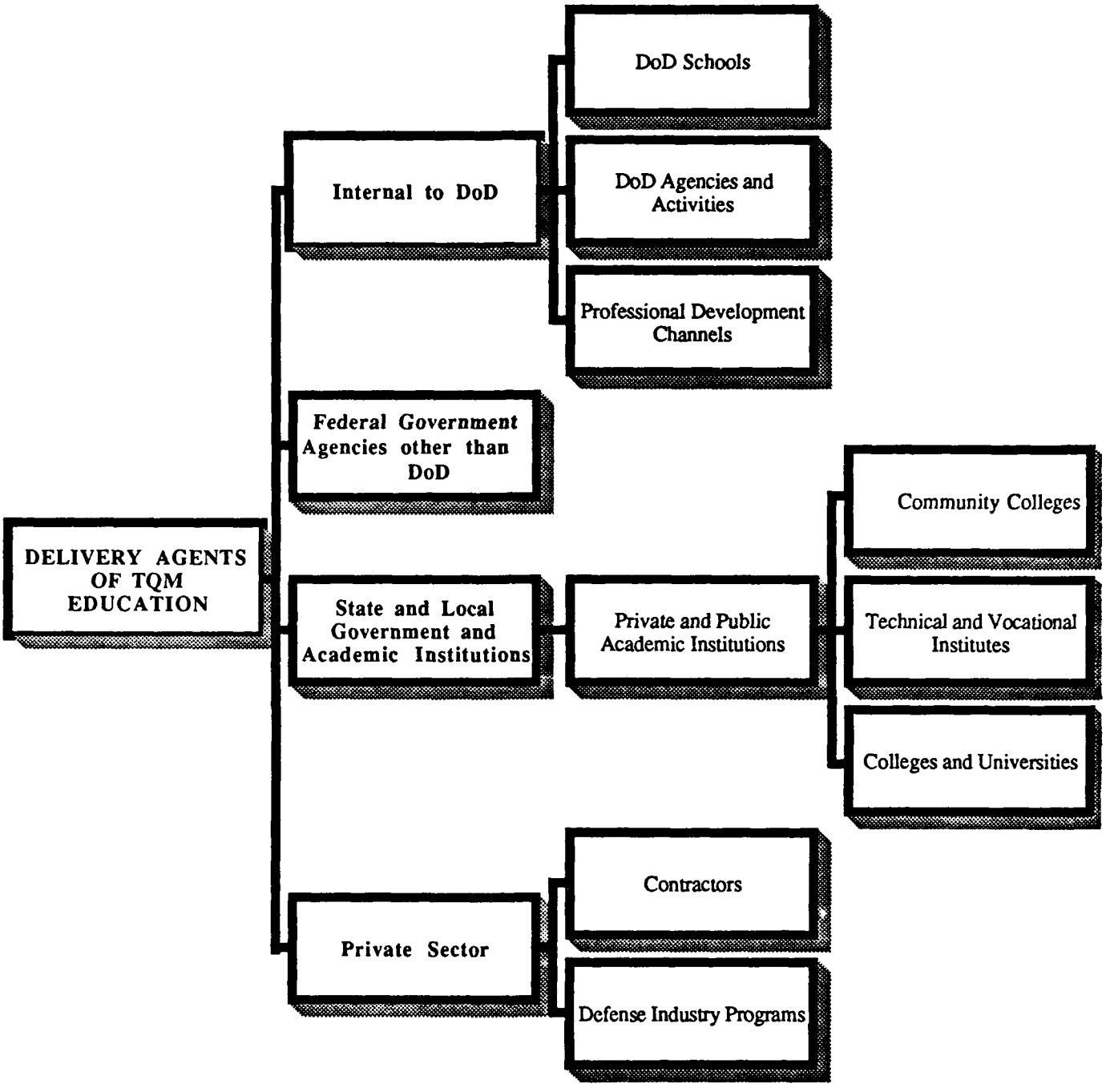

Figure 2. Delivery agents of TQM education.

Although DoD should foster the external development of TQM education and training programs, the primary emphasis should be to develop internal ones. The delivery sources discussed in this plan by no means represent an exhaustive list.

1. Delivery Agents Internal to DoD

a. DoD Schools

All DoD schools, including the DSMC, senior service schools, and technical schools, will serve as the primary delivery agents for TQM education. Currently, there are no DoD schools that have comprehensive TQM programs, but many offer some subset of courses (usually statistical), and most are willing to expand their curricula to include TQM. A list of DoD schools to be used as potential education and training sites is provided in Appendix G along with a brief discussion of their current and future TQM involvement.

b. DoD Agencies and Activities

Many systems commands have their own management development programs and courses. Organizations such as the NAVAIR Executive Institute, NAVSEA Professional Development Center, and the Federal Executive Institute may also provide TQM education and training. There are other educational programs which offer TQM-related courses, such as a productivity and quality awareness course under development and the "Transition from Development to Production" course, both under the auspices of the Assistant Secretary of the Navy (S&L).

c. Career Development Channels

DoD already has many professional career development activities that either offer courses or determine course requirements for specific jobs and career tracks. These programs typically lay out a plan for education and training integrated with career assignments. TQM education should be integrated into those channels.

Formal career development programs for civilians exist in many different areas such as logistics, procurement, and quality assurance. Moreover, the Navy recently began a Civilian Materiel Professional Program. There are also many military career fields such as the Supply Corps. All the Services have begun to develop special programs for senior officers in materiel acquisition or management, such as the Air Force Acquisition Management Program, the Army Materiel Acquisition Management Program, and the Navy Materiel Professional Program. It is important to involve these communities in integrating TQM education into these career paths as soon as possible.

The Acquisition Enhancement (ACE) Program Office, located at the DSMC, could play a significant role in integrating TQM into career development channels. It has broad responsibilities to coordinate educational and funding requirements and course offerings across DoD for acquisition personnel. It could assist, for example, in inserting TQM educational requirements into the developmental requirements for the various career areas in military leadership and acquisition programs.

d. Additional Sources of Education

There are additional sources of educational programs. Although these other sources may not be suitable for the presentation of awareness courses, they might be useful vehicles for follow-on, special, or more technical courses, and useful for getting information to government personnel (military or civilian) who work outside of the normal chains (e.g., reservists, people on extended temporary duty overseas). These additional sources include:

- Service school correspondence course programs.
- Accredited off-campus instruction programs (e.g., Army Logistics Management Center [ALMC]).
- Learning resource centers (e.g., ALMC Resource Center).

2. Non-DoD Government Sources of Education

TQM awareness programs are currently being developed/offered by agencies within the federal government, but outside of DoD. Some of these are available to DoD personnel, such as the Executive Overview of TQM course offered by the newly established Federal Quality Institute (FQI).

3. State and Local Government and Academic Institutions

Public and private schools and technical institutes may be providers of free or relatively inexpensive education. It would be desirable to eventually have all educational institutions (e.g., universities, colleges, community colleges, and vocational institutes) integrate TQM into their academic programs. College graduates would then be entering government positions knowledgeable about TQM. As an initial effort, community colleges and vocational institutes can be requested to provide TQM education and training. Several universities across the nation currently have or are developing quality management programs. DoD should encourage the development and coordination of these programs.

4. Private Sector

a. Contractors

Due to the shortage of TQM expertise (particularly instructors) within DoD, external sources will need to be used to supplement internal sources during the initial phase of education. Numerous contractors are developing and offering TQM courses. It is desirable to have some sort of certification process or method of identifying those qualified. One method for ensuring quality contractors is to have a resource center provide names of those contractors determined by DoD experts to meet its qualifications. Another method is to have a master contract with several approved/certified contractors, easily accessible using government work order requests. This would avoid the lengthy and complex contracting process. This is the method being used by the FQI.

b. Defense Industry Programs

One of the goals of TQM is to develop cooperative and mutually beneficial relationships between the supplier and the customer (in this case, defense industry). Many of the major defense contractors are already developing in-house TQM programs. Some contractual agreement could be reached between government and the contractors to permit personnel from both groups to jointly attend education and training programs. The exchange of course curricula and resource materials between government and industry is also recommended.

VIII. EDUCATIONAL SUPPORT

A. Resource Center

A DoD resource center is a desirable adjunct for an effective education and training program. To maintain cost-effectiveness, it is essential to minimize redundancy in the development of courses and materials. A clearinghouse with computer search facilities and experienced consultants would enable training developers to select existing modules to use in their own programs and would provide support during all phases of the implementation.

As part of the resource center, a case study data bank should be developed to disseminate information gained from TQM implementation. Computer access to this data bank could be made available from resource centers in addition to traditional DoD information networks and bulletin boards. An on-line TQM applications journal updated every month or quarter could provide generic application packages for practitioners and trainers.

Factors to consider in designing a resource center include location, accessibility, management staffing, and material requirements. The resource center will be needed most in the early stages of TQM implementation to provide materials and expertise not yet available internally. As the individual Services and DoD agencies build their own internal expertise, resource materials, and training capabilities, the DoD resource center can limit its scope to providing an automated communication link between the components.

B. Additional Sources

Additional educational support may be solicited through the unions, professional associations, and media sources such as federal or military newspapers. Support could be in the form of a resource center outside DoD, the sponsoring of TQM programs, conferences, or the provision of networks for dissemination of information.

IX. EVALUATION OF THE EDUCATIONAL PROGRAMS

The effectiveness of the educational programs needs to be evaluated. There are three primary stages of educational evaluation (Tuckman, 1979). The first is to determine the extent to which the information provided in the course was learned. This can be done using a test or assessment instrument. The second stage involves determining if, and to what degree, the information has been appropriately applied at the workplace. This type of evaluation is usually conducted one to three months after completion of the training. The third stage involves measuring the effect on the organization, and is usually conducted six months to one year after training and possibly thereafter on an intermittent basis.

Each school should be responsible for evaluating whether the students attending its courses have met the stated learning objectives. Determining whether the new knowledge has been applied and measuring the effect of that application on the organization will require on-site evaluation.

X. TQM CONTINUING EDUCATION AND SPECIAL COURSES

TQM implementation requires continuing education and training. The awareness courses described in this report offer just that: awareness. A detailed strategy for developing follow-on programs should be developed. Follow-on training should be tailored to specific jobs and organizations. This involves conducting front-end analyses of the different subgroups (hierarchical and functional) to identify specific training requirements and optimal content and delivery methods. A recommended method for design and development of instruction is shown in Appendix H.

Different professions will require different training focuses as well as different types and levels of expert tools. For example, engineers will need training in advanced statistical methods, while secretaries may be able to improve office procedures using the seven basic graphic tools. Levels and categories of proficiency will need to be determined. Organizing training in this way could assist professional development and training specialists in determining requirements and needed resources for long-term planning.

Courses are needed for persons assigned by their organizations to function as TQM statisticians, coordinators, and facilitators. TQM statisticians must have expertise in theoretical and applied statistics and scientific and process improvement methods in addition to a strong foundation in TQM philosophy. They serve as internal experts and statistical consultants to management and working teams. TQM coordinators must understand TQM theory and application. They coordinate TQM efforts across the organization including assisting in logistics and training, scheduling, documenting TQM activities, and serving as internal consultants if their knowledge and experience permit. Coordinators do not manage TQM, but assist the top leadership in that role. TQM facilitators must be skilled in group dynamics and facilitation, team building, and effective communication. They should have some knowledge of TQM theory and quantitative methods,

although advanced knowledge is not required since they usually work at the organizational level where data is collected. These functions are all necessary for TQM implementation, although they can overlap. In some cases, persons could be trained to serve as both instructors and facilitators, or a statistician may be the instructor for advanced statistical courses. Development of training programs for coordinators and facilitators should be completed within one year. In consideration of continuous improvement, follow-on sessions should be conducted to allow participants to review course material, share experiences with other facilitators, obtain new and updated information, and instruct new facilitators.

Training of new people must also be addressed. Employees in transition (civilian and military) and new employees will need to be indoctrinated. Since these people will enter their new jobs one at a time, organizations need to have an orientation and follow-on training for these people. If an awareness program exists in a nearby location, new employees could be sent at minimal cost. In-house indoctrination courses given periodically or use of video tutorials or interactive video may be the preferred means.

XI. FUNDING

Educational funding should be an item on the early agendas of the various ESCs at OSD, the DoD agencies, and Services. Several topics related to short- and long-term funding must be addressed. They include:

- Research, design, and development costs (personnel, materials, time).
- Delivery costs (instructors, facilities, materials, time).
- Sources of funding.
- Distribution of funds (competing needs within and between organizations).
- Requirement for TQM compared with requirements for other current education and training.
- Accounting and evaluation systems.

XII. RECOMMENDATIONS

The Defense Council on Integrity and Management Improvement (DCIMI) will be responsible for determining which committees and/or boards will carry out the following recommended actions:

1. Development of a management infrastructure for the DoD TQM education and training program.

    - The DCIMI will establish within DoD an education and training QMB (Quality Management Board), which will include DoD education and training specialists, managers, and TQM experts.

    - The QMB members will receive ongoing TQM education by a facilitator/instructor.

    - The QMB will review the DoD TQM education and training strategy and begin drafting action plans.

    - The QMB will be responsible for identifying requirements for all DoD TQM education and training. Government TQM experts (contractor, if necessary) will be appointed or hired.

2. Identification of issues related to funding TQM education. Programming and budgeting actions should be taken where necessary.

3. Identification of TQM educational resources internal and external to DoD.

4. Development of programs for (a) course developers, (b) instructors, (c) facilitators, (d) evaluators, (e) TQM coordinators, and (f) statisticians. Existing awareness and training programs will be used initially (e.g., those available through the Navy Personnel Research and Development Center, consultants, the Defense Systems Management College).

5. Design of awareness courses that include basic philosophy and principles, statistical thinking, basic process analysis methods, group development skills, and knowledge about changing organizational culture.

6. Determination of delivery agents and locations.

7. Presentation of awareness courses; modification, packaging, and distribution of them.

8. Development of TQM follow-on training programs designed to meet special needs of organizations.

9. Evaluation of methodology for both individual courses and the overall TQM education program.

10. Establishment of a TQM resource center for distributing educational materials.

11. Encouragement of public and private educational systems to integrate TQM curricula into their academic programs so that graduates will be knowledgeable about TQM.

12. Integration of TQM education and training into the career development of DoD employees.

13. Initiation and support of research programs on how best to educate and train the work force, particularly management, in the philosophy and application of TQM.

XIII. ADDITIONAL ISSUES

A. Senior Management Education

There should be a specific focus on senior management education. These people seldom receive continuing education or training. They usually have extensive education and experience in management, some of which may not be compatible with TQM. Since educating senior managers and gaining their commitment are the keys to successful implementation of TQM, it is important that educational methods tailored to their needs be developed.

B. Educational Technology and TQM

There needs to be research conducted on how best to teach TQM through the use of new technology, such as interactive video. Educating all of the DoD work force will require massive training over a long period of time if traditional methods of education are used. New developments in educational technology could expedite that process. Also, TQM involves changing the way people think and behave (e.g., thinking systemically and statistically, cooperating rather than competing). Traditional forms of education do not address these types of changes. Better methods of assisting people to learn and apply this information need to be developed, tested, and evaluated.

C. Integrating Group Development Training into TQM Education and Training

Skills in team building and effective communication are essential components of successful team functioning. There are many courses in both the public and private sector that teach these skills. However, the best way to integrate group development training with education and training in TQM philosophy and tools needs to be addressed.

D. Changing to a TQM Organizational Culture

Fundamental to the successful implementation of TQM is developing an organizational culture of leadership and teamwork consistent with Deming's 14 principles. This includes eliminating obstacles such as management policies and practices that emphasize short-range goals rather than long-range strategic planning, personnel practices that force management rotation, current performance and reward systems that inappropriately discriminate and foster competitive rather than cooperative behavior, formal organizational structures that are distant from and insensitive to customer needs, and centralization of control over purchasing and personnel management policy, all practices that do not give highest priority to quality. The most difficult part of creating a TQM organizational culture involves changing thinking, attitudes, and behaviors. Education is needed that focuses on identifying and overcoming obstacles to TQM and on creating a work environment where teamwork and a "continuous improvement culture" can thrive.

XIV. SUMMARY

Actions leading to TQM transformation are emerging in DoD. A necessary ingredient for success is a quality education and training program that is continuously improving to meet the needs of managers. The strategy for that program has been described in this report. The next goal should be to translate this strategy into action, develop test models (prototypes), begin implementation, evaluate the process, and, in the TQM mode, continue to improve upon it.

REFERENCES

Cocheu, T. (1989). Training for quality improvement. *Training and Development Journal, 43*(1), 56-62.

Deming, W. E. (1986). *Out of the crisis* (p. 88). Cambridge, MA: MIT, Center for Advanced Engineering Study.

Houston, A., & Dockstader, S. L. (December 1988). *A total quality management process improvement model* (NPRDC Tech. Rep. 89-3). San Diego, CA: Navy Personnel Research and Development Center.

Metz, E.J. (Summer 1984). Managing change: Implementing productivity and quality improvements. National Productivity Review, 3, 303-314.

Scholtes, P. R., and Hacquebord, H. (1988). Six strategies for beginning the quality transformation, Part II. *Quality Progress, 21*(8), 44-48.

Tuckman, B. W. (1979). *Evaluating instructional programs*. Boston, MA: Allyn & Bacon.

RECOMMENDED READINGS

Anderson, R. C., & Faust, G. W. (1973). Educational psychology: The science of instruction and learning. New York: Dodd, Mead.

Ackoff, R. L. (1981). Creating the corporate future: Plan or be planned for. New York: John Wiley & Sons.

Deming, W. E. (Winter 1981-1982). Improvement of quality and productivity through action by management. National Productivity Review, 1, 12-22.

Deming, W. E. (1986). Out of the crisis. Cambridge, MA: Massachusetts Institute of Technology.

Garvin, D. A. (1984). What does "product quality" really mean? Sloan Management Review, 26 (1), 25-43.

Harrington, H. J. (1987). The improvement process: How America's leading companies improve quality. Milwaukee, WI: Quality Press.

Houston, A., & Dockstader, S. L. (1988). A total quality management process improvement model (NPRDC Tech. Rep. 89-3). San Diego: Navy Personnel Research and Development Center.

Ishikawa, K. (1985). What is total quality control? The Japanese way. Inglewood Cliffs, NJ: Prentice-Hall.

Juran, J. M. (1981). Juran on quality improvement workbook. New York: Juran Enterprises, Inc.

O'Neil, H. F., Jr. (1979). Procedures for instructional systems development. U.S. Army Research Institute for the Behavioral and Social Sciences, Alexandria, VI: Academic Press.

Ouchi, W. G. (1984). The M-Form society: How American teamwork can recapture the competitive edge. Reading, MA: Addison-Wesley.

Scherkenbach, W. W. (1987). The Deming route to quality and productivity. Rockville, MD: Mercury Press/Fairchild.

Wheeler, D. J., & Chambers, D. S. (1986). Understanding statistical process control. Knoxville, TN: Statistical Process Controls, Inc.

Tribus, M. (1988). Quality first: Selected papers on productivity improvement (National Society of Professional Engineers, Publication #1459). Washington, DC: American Quality and Productivity Institute.

Walton, M. (1986). The Deming management method. New York: Dodd, Mead.

APPENDIX A

TQM TOPICS, METHODS, AND TOOLS

APPENDIX A

TQM TOPICS, METHODS, AND TOOLS

I. Awareness
   A. Overview of the quality problem (worldwide, U.S., government)
      1. The threat and challenge of foreign competition
      2. Quality of American products and services
   B. History of management, quality focus and control, and quality management
      1. Post-WWII management philosophies
      2. Management-worker values, relations and attitudes
   C. Definition of quality (quality in government/DoD)
   D. Achieving quality
      1. Detection versus prevention approach
      2. Definition and examples of process
   E. Definition and explanation of Total Quality Management (TQM)

II. TQM philosophy and key concepts
   A. Production viewed as a system
   B. Cost of quality
      1. Cost of detection
      2. Visible versus hidden costs
      3. Cost of quality categories (internal and external failure, appraisal, exceeding requirements, lost opportunities, "unknown-unknowable," prevention)
   C. The chain reaction of quality and productivity
   D. The paradigm shift (from machine age thinking to systems age thinking)
   E. Management of outcomes versus management of processes
   F. Continuous improvement
   G. Variation: common and special causes
   H. Taguchi loss function
   I. Customer orientation (customer-supplier relations)
   J. Cross-functional management teams
   K. Four prongs of quality

III. Basic methods and tools
   A. Scientific method: Plan-Do-Check-Act cycle and the Process Improvement Model
   B. Process capability analysis (process control and customer requirements)
   C. Process analysis, control, and improvement process
   D. Basic descriptive and graphics methods
      1. Basic graphic tools
         a. Flow chart
         b. Cause-and-effect (fishbone) diagram
         c. Pareto chart
         d. Histogram
         e. Scatter diagram
         f. Run chart
         g. Control chart
      2. Management and planning tools
         a. Affinity chart
         b. Interrelationship digraph
         c. Tree diagram
         d. Matrix chart

e. Matrix-data analysis
f. Process decision program chart
g. Arrow diagram
h. Check list
i. Stratification matrix

F. Fundamentals of measurement
1. Data collection and measurement
2. Qualitative and quantitative data
3. Factors that affect measurement
4. Outcome vs. process measures

G. Fundamentals of experimental design (baselining, pre-post comparisons)

IV. Management responsibility and leadership
A. Vision and philosophy
B. Management practices to support TQM
C. TQM strategic planning and decision making
D. Organizational TQM structures
E. Policy deployment
F. Customer satisfaction
G. Customer-supplier interface
H. Implementation process/guidelines
I. Creating the organizational culture
1. Management of participation
2. TQM leadership
a. Leading by example
b. Role of guide, mentor, teacher
c. Personal responsibility for quality
d. Team building and group facilitation

V. Group dynamic skills
A. Group dynamics and team building (overcoming resistance)
B. Effective communication
C. Group problem solving (brainstorming, nominal group technique)
D. Win-win strategy: agreement, alignment
E. Negotiation and conflict resolution
F. Purpose and focus

VI. TQM implementation
A. Organizational TQM structures
B. Developing the implementation plan (short- and long-term)
C. TQM education and training strategy
D. Creating the organizational culture
1. Implementing the 14 points
2. Overcoming obstacles
3. Combating the deadly and dreadful diseases
4. Cooperation and teamwork: cross-functional teams
E. Quality improvement process (PDCA)

VII. Advanced methods
A. Advanced scientific methodology
B. Quality function deployment (QFD)
C. Quality policy deployment (QPD)

D. Off-line experimental methods and process
    1. System design, concurrent engineering
    2. Parameter and tolerance design (design of experiments, Taguchi approaches)
    3. Inventory control/product engineering
E. On-Line experimental methods and processes
    1. Measurement engineering
    2. Process control and improvement
F. Socio-technical design of work
    1. Integration of human and technical systems
    2. Methodology for work system design

APPENDIX B

TWO-DAY SENIOR MANAGEMENT AWARENESS COURSE

APPENDIX B

TWO-DAY SENIOR MANAGEMENT AWARENESS COURSE

OVERVIEW

The first part of the two-day course will be directed toward defining the key concepts of TQM and their translation into DoD activities. These concepts include: quality, process, variation, and continuous improvement. Lecture, videotapes, and case studies will be used. The content of instructional techniques will relate to the goals of the DoD TQM Master Plan.

Once quality awareness becomes a part of a senior manager's organizational philosophy, it is critical that awareness be transformed into actions within the workplace. Senior managers have proven leadership skills. It would be their charge to use these skills to motivate, coach, and guide the work force toward the same level of quality awareness and toward appropriate behaviors. Therefore, the second aspect of the training should enhance their team building and related skills, such as those used for problem solving, decision making, consensus building, and the development of action strategies.

Participants need to begin a process of planning that will take them well beyond the two days of training. In this respect, the final portion of the two-day course should be devoted to developing a TQM commitment toward specific actions from each of the senior managers.

OBJECTIVES

Overall Objective

Participants will understand the basic concepts of TQM and acquire an overview of the basic tools of analysis. Participants will also understand management's role and expected behaviors.

Specific Objectives

A. Participants will be given:

- A brief history that explains today's quality problems
- Examples of TQM applications worldwide, in the U.S., and in DoD
- The definition and scope of quality and an overview of TQM
- The key management practices underlying the implementation of TQM
- The importance of a systems, statistical, and process-oriented way of thinking
- The necessity of long-range planning and commitment

B. Participants will have some basic guidelines to use in their roles as leaders during the implementation of TQM in their organizations.

C. Participants will believe that:

- TQM can help them to improve work processes
- TQM is the way to reduce costs and increase productivity
- They have a key role in institutionalizing TQM

- DoD can improve national defense for significantly less money than is currently being spent

D. Participants will be willing to:

- Engage in further education and training about TQM and actively encourage their subordinates and colleagues to do so
- Lead and support TQM implementation
- Publicly recognize, encourage, and, where possible, support organizations in DoD and the defense industry where strides are being made in implementing TQM

CURRICULUM OUTLINE

A. What is meant by TQM?

1. TQM history and background
2. Definitions and general explanation of basic principles:
   a. TQM
   b. Quality
   c. Process
   d. Variation
   e. Continuous improvement

B. Management's role and behaviors during TQM implementation:

1. Committed leader (public expression of intent and actions they will take)
2. Active, involved participant
3. Change agent of organizational culture through effective communication and teamwork
4. Provider of resource support

C. Basic methods and tools of analysis

1. Plan-Do-Check-Act (PDCA) cycle
2. Basic statistical tools

APPENDIX C

EIGHT-DAY GENERAL MANAGEMENT AWARENESS COURSE

APPENDIX C

EIGHT-DAY GENERAL MANAGEMENT AWARENESS COURSE

OVERVIEW

The eight-day TQM course is designed to provide exposure to (1) quality awareness and TQM philosophy; (2) quantitative methods to analyze processes; (3) group development skills, essential in building trust and sharing ideas within the workplace; and (4) knowledge about how to change organizational culture and overcome obstacles to implementing TQM. The course can be modified to meet the diverse needs of the managers. This flexibility is an important feature of the eight-day class.

This workshop is organized into two sessions, one lasting five days and one lasting three days. The two sessions are separated by a three-week "back at work" interval. The first five-day session is devoted to quality awareness, systems thinking, statistical thinking, the concept of process improvement, decision making, and interpersonal skills. Emphasis is placed on the development of effective communications and consensus building through the use of role playing and group participation exercises that focus on quality-related issues. Trainees will also be exposed to some of the action-oriented skills that will allow them, when they are back at work, to define processes that they are involved with, to suggest possible causes of variations, and to collect data. The "back at work" interval provides the setting where many of the concepts and methods acquired during the first five-day session are applied.

Upon return, the participants will be involved in (1) training in the additional statistical tools that aid in summarizing the data collected at the workplace, (2) learning of additional TQM concepts, and (3) learning how to recognize and overcome barriers they are likely to encounter.

The eight-day workshop should also involve the participants in follow-up projects, such as developing objective measures of quality improvement, tying into a TQM resource center, and networking with workshop trainees.

OBJECTIVES

Overall Objective

Participants will understand the definitions and key concepts of TQM and the strategies for continuous improvement. Participants will also understand the basic concepts involved in data collection and how to apply quantitative tools and procedures to process analysis.

Specific Objectives

A. Participants will be given:

- The history and background leading to national quality-related problems in both the private and public sectors
- The history of quality management
- The definitions, key concepts, and principles of TQM
- The definition and importance of management's role

- The appropriateness of using quantitative methods and graphic tools for data collection and measurement
- The basics of statistical and measurement theory

B. Participants will believe that TQM is a way to reduce the variation in processes, an approach resulting in higher quality, reduced costs, and increased productivity

C. Participants will be willing to:
- Engage in further education and training about TQM
- Lead and support TQM implementation
- Initiate specific TQM-related actions in their work activities

CURRICULUM OUTLINE

A. Overview of the quality problem
1. The real threat and challenge of foreign competition
2. Quality of American products and services
3. Examples of DoD quality problems

B. History of quality and quality management worldwide and in the United States
1. Post-WWII management philosophies and practices
2. Management and workers' attitudes and relationships
3. History of TQM in DoD

C. TQM guiding principles concerning relationship of quality to productivity and cost
1. Quality-productivity-cost relationship (chain reaction of quality and productivity)
2. Detection versus prevention
3. The cost of quality

D. TQM key concepts
1. Production viewed as a system
2. The paradigm shift
3. Continuous improvement
4. Management of processes versus management of outcomes
5. Variation: common causes and special causes
6. Customer orientation
7. Cross-functional management teams

E. Strategies for process improvement (Plan-Do-Check-Act cycle)

F. Responsibilities of management in TQM implementation

1. Team building and group facilitation
2. Communication (breaking down barriers, developing and supporting effective horizontal and vertical communication)
3. Leadership (should be a "follow me" approach; management must lead by example, be mentors, guides, and supporters)
4. Transforming organizational culture

G. Understanding graphic tools

1. Application of tools and procedures
   a. Flow chart
   b. Cause-and-effect (fishbone) diagram
   c. Pareto chart
   d. Affinity diagram
   e. Histogram
   f. Scatter diagram
   g. Check sheet
   h. Run chart
   i. Control chart
   j. Matrix diagram
   k. Tree diagram
   l. Process decision program chart
   m. Arrow diagram
2. Appropriateness of tools for particular situations

H. Introduction to data collection

1. Collection of meaningful data
2. Qualitative and quantitative data

I. Basic statistics

1. Statistical theory
2. Statistical thinking
3. Statistical approach to continuous improvement

J. Measurement

1. Factors that affect measurement
2. Outcome versus process measures

APPENDIX D

EDUCATION OF SENIOR MANAGERS IN DoD

APPENDIX D

EDUCATION OF SENIOR MANAGERS IN DoD

This population is characterized by:

- Heterogeneity, representing a great variety of backgrounds and job experiences.
- Holding jobs that cover a wide span of responsibilities. These managers are often double- or triple-hatted and report to several superiors or constituencies.
- Holding jobs with significant time constraints:
  - Time demands fragmented.
  - Must be mission-ready at all times.
  - Continuous, multiple, and sometimes conflicting demands.
  - Lack of control over own time.
- Diversity of opinions of what constitutes good management practices.

In planning for the education of senior managers, consideration needs to be given to a population of executives who must be able to:

- Deal with rapid change.
- Continuously improve the systems and processes of their organizations.
- Be innovative (to meet current customer needs as well as anticipate future ones).
- Understand their role in influencing organizational culture.
- Engage in strategic planning, long-range thinking, and systemic thinking.
- Effectively coordinate the activities both within their own organization and with many other organizations.

APPENDIX E

STUDENT LEARNING STYLES AND INSTRUCTIONAL METHODS

APPENDIX E

STUDENT LEARNING STYLES AND INSTRUCTIONAL METHODS

The premises of adult learning theory as applied to DoD managers should be considered prior to determining optimal learning styles. One tenet of adult learning theory is education versus re-education. Education involves teaching new knowledge, skills, and behaviors; re-education involves teaching new ones and changing or replacing old ones. Resistance to learning new information is common, particularly when it appears to contradict the old. Teaching new knowledge is easier than changing attitudes and behaviors. Adults, unlike children, already have preconceived ideas, as well as knowledge, skills, attitudes, and behaviors that are well-ingrained. Many of the management theories and practices of TQM are radically different from the traditional management practices used by DoD managers. The initial response may be resistance or rejection of the new information.

Adult learning theory also states that adult students are self-directed, bring a rich resource of experience to the situation, will only learn new information if it is perceived as relevant to their own needs, have an orientation to learning that is task- or problem-centered, and are primarily internally motivated. The theory also states that participative learning is more appropriate than non-participative for the development and administration of executive education (and that experiential learning often involves the re-formulation of action goals and plans).

A combination of approaches is recommended that includes experiential learning techniques, case studies, team development and group exercises, video tutorials, and the traditional lecture-seminar format with expert instructors.

APPENDIX F

CLASSROOM MATERIALS

APPENDIX F

CLASSROOM MATERIALS

Reading materials should be distributed to students one to two weeks prior to the beginning of the course. The readings should be based on the population. Readings should be limited to general overviews and an outline to give the students an idea of what the course will cover.

In-class handouts should include books or articles on the subject, workbooks or handouts that will be used in the course, and materials for future reading and reference. The selection of materials will vary with class composition. Course designers need to ensure consistency in the materials prepared for different groups. Materials will generally cover: facilitation, case studies, orientation and overview, management and group dynamics, statistical process control, measurement and analysis, process analysis, problem solving and decision making, PDCA improvement cycle, and specific tools.

Other materials are usually handed out and described as "additional" recommended readings. A list of recommended books and articles should be included. Larger organizational entities may wish to establish a TQM library or resource center where materials are available for loan or purchase.

Materials for the instructors also need to be developed. These include instructor manuals and guides, workbooks, tests, and evaluation instruments. Development of the materials can either be done by the course developers or contracted out if the developers do not have the resources needed.

APPENDIX G

DoD CANDIDATE SCHOOLS AND INSTITUTIONS TO PROVIDE TQM EDUCATION AND TRAINING

APPENDIX G

DoD CANDIDATE SCHOOLS AND INSTITUTIONS TO PROVIDE TQM EDUCATION AND TRAINING

Air Force Institute of Technology, Wright-Patterson AFB, Dayton, OH
Air Training Command, Lowry AFB, Denver, CO
Air War College, Maxwell AFB, AL
Armed Forces Staff College,
Army Command and General Staff College, Ft. Leavenworth, KA
Army War College, Carlisle, PA
Defense Systems Management College, Fort Belvoir, VA
Extension Course Institute, Gunter AFB, AL
Industrial College of the Armed Forces, Washington, DC
Navy Acquisition Management Training Organization, Norfolk, VA
Naval Post Graduate School, Monterey, CA
Naval War College, Newport, RI
Systems Acquisition School, Air Force Systems Command (AFSC), Brooks AFB, TX
U.S. Air Force Academy, Colorado Springs. CO
U.S. Army Logistics Management College, Fort Lee, VA
U.S. Army Management Engineering Training Activity, Rock Island, IL
U.S. Military Academy, West Point, NY
U.S. Naval Academy, Annapolis, MD

There are also many training facilities for civilian and military executives, such as the Naval Aviation Executive Institute and the Naval Supply Corps School, that can provide TQM education.

A person at each of the listed schools was contacted by telephone. The schools differ with regard to their student population and teaching missions. All of these schools address acquisition in their curricula although emphasis and focus vary. Each contact was asked if the school was currently teaching TQM or some aspect thereof (e.g., SPC). Just over one-third were found to address TQM concepts in quality and reliability courses, in management courses, or throughout their curricula. Previous information collected indicates that the TQM focus is primarily statistical.

The contacts were also asked how they would prefer to integrate TQM into their curricula. All but two said they would prefer to take an outline or proposed course criteria and develop their own courses and materials so that they can tailor them to their student populations.

There should be some coordination among all schools. The QMB E&T can assist in this regard. Some of the schools will be able to provide a wide variety of TQM awareness, managerial, and technical courses, while others should specialize in training that is consistent with their mission goals.

APPENDIX H

INSTRUCTIONAL SYSTEMS DESIGN (ISD) APPROACH AND MODEL FOR TQM EDUCATION AND TRAINING STRATEGY

APPENDIX H

INSTRUCTIONAL SYSTEMS DESIGN (ISD) APPROACH AND MODEL FOR TQM EDUCATION AND TRAINING STRATEGY

ISD APPROACH

1. Define skills, knowledges, and abilities required for TQM.

2. Determine differences between the students' current skills, knowledges, and abilities and the desired ones.

3. Describe the relevant characteristics of the student population.

4. Develop the overall educational objectives, what is to be accomplished as a result of the instruction, taking into account that education is almost always necessary, but rarely sufficient, for behavioral change. This process must be paired with complementary actions.

5. Develop instructional objectives, in as explicit a form as possible, followed by development of learning objectives and learning steps required for mastery of those objectives. This, in essence, is a course outline.

6. Group learning objectives into categories and identify guidelines for optimum learning for each category.

7. Select media that takes into account the students' characteristics, the learning guidelines, the educational setting, and costs.

8. Develop and test instruction. Incorporate needed improvements.

9. Implement instruction. Perform internal and external evaluation. (Internal evaluation assesses whether the students learned what was intended during the course. External evaluation assesses whether the instruction had the desired effects on subsequent job and team performance.)

10. Use evaluation data as feedback for continuous improvement.

The above process involves a great deal of work by persons skilled in the area of educational design and TQM. This is the general process that should be used in developing TQM courses to ensure a quality product. The following plan outlines a strategy of what needs to be done.

APPLICATION OF ISD APPROACH TO TQM EDUCATION AND TRAINING STRATEGY

Identify Training Resources and Requirements

The first step in designing a training plan is to determine resource requirements. These include:

Personnel: This resource includes training developers and training materials developers (manual writers, audio/visual media producers, and technical editors), students, instructors to pre-

train the trainers, trainers and training evaluators, and administrators (for quota control, scheduling, logistics coordinating, site coordinating, and registration).

Materials: Training equipment includes tape recorders, video recorders, video cameras, overhead projectors, computer monitors, video players, interactive microcomputers, graphic aids, handbooks, manuals, texts, instructions, handouts, and policy/guidance statements.

Physical Sites: Location and facilities for training (schools, hotels, conference centers, etc.).

Identify Education and Training Strategies

The second step is to identify the education and training strategies. The terms "population" and "student" are interchangeable.

1. Identify the population to be trained (target student groups).

2. Conduct a needs assessment of each target group to identify training objectives.

3. Develop terminal learning objectives for each training group or program.

4. Develop curriculum outlines.

5. Determine adult student learning styles.

6. Develop instructional methodologies that consider adult learning styles.

7. Design and develop curriculum modules using methodologies that work best for the particular target group and subject matter.

   Examples of methodologies include: adult learning strategies, experiential learning techniques, individualized learning approaches, team development and group exercises, computer simulations, audio-visual and multi-media portable packages, programmed learning materials, computer-aided and computer-managed instruction, interactive video disk and videotape instruction, case study applications, video tutorials, mentor-guided on-the-job applications, learn-as-you-go prototype applications, role playing, and traditional lecture/seminar format.

8. Develop evaluation process and criteria.

9. Conduct prototype course (test, evaluate, modify).

Identify Delivery and Implementation Strategies

The third step is to identify delivery and implementation requirements. These include:

1. Minimum and maximum student in-class or instruction hours.

2. Number of instructor contact hours (if instructors will be used).

3. Pre- and post-course study or work requirements.

4. Course prerequisites, equivalencies, and waiver requirements.

5. Instructor requirements (criteria, selection, training, and evaluation methodologies). The instructor-trainer issues that need to be addressed include:

a. Instructor competencies required.
b. Ratio of internal trainers (management and training staff) to external trainers (professional trainers outside of organization--may be from DoD, other government agencies or contractors).

6. Potential instructor sources (contractors, industry experts, academic experts, DoD practitioners, DoD school experts).

7. Selection criteria for identifying individuals to be trained as instructors.

8. Instruction requirements. Questions to be addressed include:

a. How much in-class instructor time is needed?

b. Do we want full-time instructors or part-time? (If instructors are to be managers who are performing as instructors part-time, what part of their time is practical to request? Will funding for the "instructor" part of the job come from a special source?)

9. Optimal class size and student configuration (homogeneous or heterogeneous).

10. Location and facilities.

11. Evaluation methodology and process (internal and external).

12. Development of prototype courses (test, evaluate, and modify).

DISTRIBUTION LIST

Distribution:
Assistant Secretary of Defense (P&L) (TQM/IPQ)
Deputy Secretary of Defense
Defense Technical Information Center (DTIC) (2)

Copy to:
Assistant Secretary of Defense (FM&P)
Deputy Under Secretary of Defense for Research and Engineering (Research and Advanced Technology)
Assistant for Training and Personnel Systems Technology (OUSD) (A)/R&T (E&LS)
Director, Defense Activity for Non-Trad Education Support, Pensacola, FL
Assistant for Manpower Personnel and Training Research and Development
Director, Total Force Training and Education (OP-11)
Head, Training and Education Assessment (OP-11H)
Director, Civilian Personnel Programs (OP-14)
Director, Human Resources Management (OP-15)
Commander, U.S. ARI, Behavioral and Social Sciences, Alexandria, VA (PERI-POT-I)
Technology Area Manager, Office of Naval Technology (Code 222)
Commander, Air Force Human Resources Laboratory, Brooks Air Force Base, TX
Director, Office of Civilian Personnel Management
Chief of Naval Education and Training (Code 00)
Commanding Officer, Naval Training Systems Center
Defense Logistics Studies Information Exchange