



**Defense Acquisition University**  
**Technology-Based Education and Training Plan**

**CONCEPT DOCUMENT**

**VERSION 2.01**

**JUNE 5, 1997**





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- Attachment A: Effectiveness of Distance Learning
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# INTRODUCTION





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PURPOSE

The Defense Acquisition University (DAU) is committed to providing high-quality education and training to the members of the Department of Defense (DoD) acquisition community. Emerging technologies provide DAU with the ability to increase access to its courses while promoting effective learning experiences for individuals.

This document presents an overview of DAU's Technology-Based Education and Training Plan. This plan is the culmination of an extensive analysis process that began with the following previous studies: DAU Remote Learning Feasibility Assessment—Field Research (January 1994), The DAU Education Media Selection Guide Summary Report (January 1995), and Report on Distance Learning Technologies (March 1995).

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VISION STATEMENT

DAU's vision for technology-based education and training is as follows:

**DAU Technology-Based Education and Training  
Vision Statement**

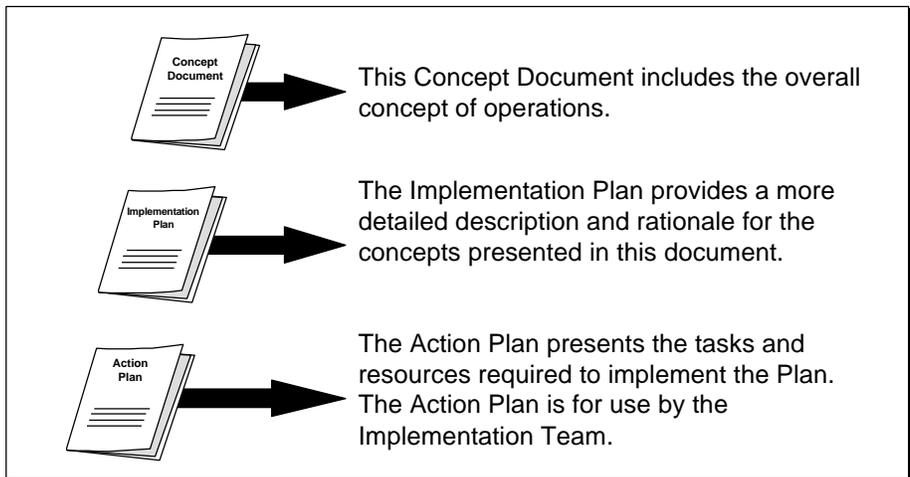
Provide an educational program that fully supports a culture of continuous learning and allows convenient, cost-effective access to education, training, performance support, and expert advice to all members of the acquisition community.

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PLAN COMPONENTS

The Technology-Based Education and Training Plan includes the following three components:



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BACKGROUND

Education and training have traditionally been delivered in a classroom setting. In the past, technology has been used to improve the quality of classroom delivery. Emerging technology allows for the delivery of courses over the World Wide Web or in a stand-alone mode using a CD-ROM. Advancements in computer technology now allow for the delivery of quality training in the learner's work setting. In those cases where classroom delivery is still best for ensuring learning, it can be delivered by the traditional "one-room classroom" or can reach larger audiences through video teletraining. As discussed below, transitioning to technology-based learning may be the only way DAU can meet its expanding education and training mission requirements while still providing quality learning experiences.

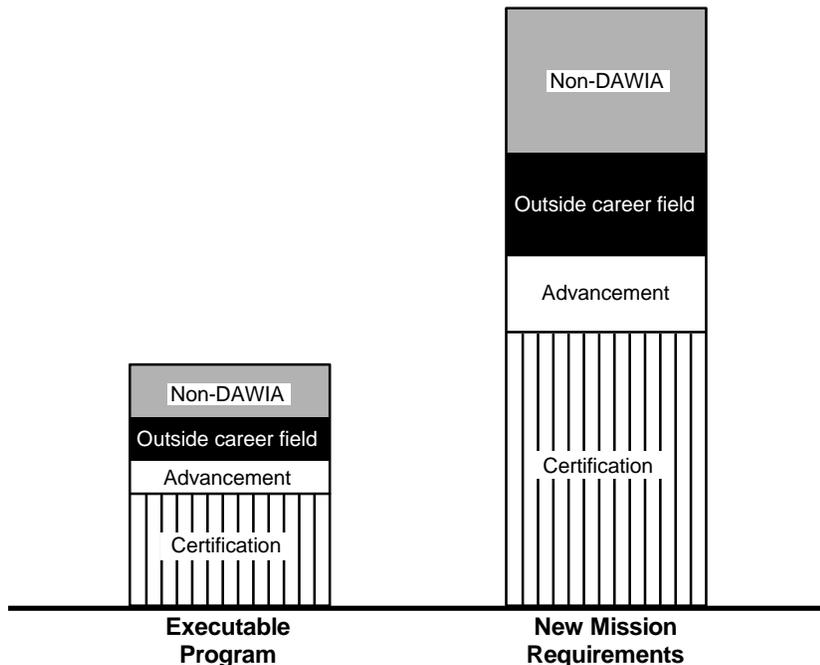
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REQUIREMENTS

Operating at full capacity, DAU courses serve approximately 34,000 individuals each year. Currently, DAU is meeting all requirements that the DoD components can execute. It is projected that the new mission requirement is nearly double that executable level, and new mission requirements further increase the demand for DAU courses. Figure 1 illustrates the increasing requirements being placed on DAU.

Figure 1. DAU Mission Requirements



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REQUIREMENTS  
(CONTINUED)

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*FULL DAU CAPACITY COULD  
BE USED TO MEET  
CERTIFICATION  
REQUIREMENTS ALONE*

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*CAREER ADVANCEMENT  
TRAINING COULD DOUBLE  
WITH EXPANDED CAPACITY*

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*INCREASED DAU CAPACITY  
IS NEEDED TO KEEP PACE  
WITH CONTINUING  
EDUCATION NEEDS*

DAU has identified the following requirements for expanding the use of technology-based instruction:

◆ **Certification Training**

Using data from the Defense Acquisition Workforce Improvement Act (DAWIA) Management Information System, DAU has determined that the annual demand for certification training to meet current job requirements exceeds 36,000 training events. Approximately half that number of individuals currently attend DAU certification courses each year. This limited enrollment may be because the combination of acquisition workforce downsizing and increasing workloads makes it difficult to release personnel to attend training away from the work site. Technology-based delivery methods are needed to increase both capacity and access to certification courses. Technology-based instruction will allow DAU to provide certification training to all who need it.

◆ **Career Advancement Training**

Currently, approximately 15 percent of individuals enroll in DAU courses to prepare themselves for career advancement by taking advanced courses in their career fields. DAU projects that the number of individuals taking courses could double with expanded capacity. Providing opportunities for career advancement is an important asset for maintaining a motivated and professional acquisition workforce.

◆ **Cross Training and Continuing Education (Outside Career Field)**

In addition to certification and career advancement, DAWIA personnel also enroll in courses for cross training and continuing education outside their career fields. Presently, 22 percent of those who enroll in DAU courses are DAWIA personnel who are outside the career field(s) for which the course is required for certification. Approximately two-thirds of those certified at Levels Two and Three have not attended the courses that are now required for certification at those levels. Continuing education is required to ensure that those previously certified are educated about new policies and business practices. These new requirements for continuing education will increase the demand for access to training across the different career fields. To meet these demands, DAU needs to increase its capacity.



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REQUIREMENTS  
(CONTINUED)

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*ADDITIONAL CAPACITY IS  
NEEDED TO SERVE NON-  
DAWIA PERSONNEL*

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*TECHNOLOGY-DELIVERED  
TRAINING INCREASES  
CAPACITY WITHIN CURRENT  
BUDGET LIMITS*

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BENEFITS

Additional requirements include the following:

◆ **Non-DAWIA Personnel**

Significant numbers of non-DAWIA personnel are turned away from DAU courses for lack of capacity. The Under Secretary of Defense for Acquisition and Technology has expanded DAU's mandate to include serving the entire acquisition community. This mandate, which potentially could involve an audience substantially larger than the DAWIA workforce itself, can only be met through increased capacity.

◆ **Operating Within Current Resources**

DAU must expand its capacity while not increasing overall operating costs. The expanded use of technology-based instructional delivery methods will allow DAU to reinvest resources to increase capacity while maintaining, or improving, the quality of learning.

Effective technology-based education and training yield many benefits for the learner and the organization. The key to effective technology-based instruction is course design. Techniques that work well in the classroom often do not translate into effective video teletraining or Web-based instruction. In addition, most benefits are derived when the course design uses a mixture of technologies. For example, the knowledge portions of a course could be delivered using Web-based instruction, followed by a video teletraining session where an interactive exercise could be facilitated among the learners at different sites.

Assuming effective course designs, DAU anticipates educational benefits will accrue from transitioning courses to Web-based/CD-ROM and video teletraining delivery, including:

◆ **Promoting Learning**

The report titled "The 'No Significant Difference' Phenomenon" (Russell, 1997) includes more than 214 research reports, summaries, and papers on distance learning. This body of research shows that comparisons between classroom-based instruction and distance learning show either no difference in learning achievement or superior learning when delivered using technology. Attachment A contains a list of these studies.



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**BENEFITS**  
(CONTINUED)

◆ **Ensuring Consistent and Current Training**

Technology can be used to ensure that every learner receives training that is consistent and current. New policies and other changes can be communicated to learners and course graduates instantaneously.

◆ **Providing Continuing Education Opportunities**

Technology-delivered training provides a mechanism for continuing education using “push system technologies” to broadcast relevant information to former students based on their training profiles.

◆ **Reducing Training Costs**

Technology enables DAU to reduce the cost of training delivery and allows for the reinvestment of those dollars to meet expanded mission requirements.

Additional benefits from Web-based/CD-ROM delivery include:

◆ **Enhancing the Learning Experience**

Adults learn best when they can exercise control over the learning situation. Technology-based instruction allows learners to:

- ◇ Select where the learning takes place (office, learning center, home). Individuals are no longer required to travel to attend courses and miss key events in the workplace or in their personal lives.
- ◇ Control when the learning takes place. Learners can take a course when they need the information to complete a critical work assignment or prepare for advancement. They are no longer required to wait for course openings.

◆ **Accommodating Differing Skill Levels**

Learners can choose how fast or how slow they proceed through the materials. In a classroom, instructors often pace their delivery to meet the needs of the “average” learner.

◆ **Allowing Instructors To Focus on Learning**

Courses using technology-based delivery allow instructors to focus on enhancing learning rather than completing administrative functions of testing and tracking learner progress.



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OVERALL STRATEGY

DAU's overall implementation strategy includes the following:

- ◆ Leveraging existing and emerging information technologies to meet both resident and distance learning requirements in a climate of reduced resources.
- ◆ Outsourcing to the private sector where those sources will provide best value to the Government.
- ◆ Investing in reinventing and refining Consortium members' roles to meet the educational/professional intent of DAWIA and to serve the entire acquisition community.

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PROGRAM GOALS

The overall goals for the technology-based training and education plan are:

**Program Goals**

- ◆ Maintain or improve the quality of the DAU curriculum.
- ◆ Transition classroom-based instruction to educationally sound technology-based delivery both in and out of the classroom.
- ◆ Increase acquisition workforce participation in DAU learning activities each year.
- ◆ Reinvest course delivery resources in information technology operations, research, learning enhancements, and workforce performance support.
- ◆ Incorporate information technology in all courses by the end of FY 2000.

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PROGRAM METRICS

DAU has established metrics for measuring the success of the technology-based education and training program. These metrics are listed in the table on the following page.

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CONCLUSION

Smart use of technology is a performance multiplier that will allow DAU to provide quality education and training to a larger audience of the acquisition community.



**Table 1. Program Metrics**

No.	Metric	FY 96 Benchmark	Goal	Measurement	Method of Measurement	Action
1	Standard Operating Procedures and Systems Infrastructure Implemented	None	FY 97-Completed FY 98-Enhanced	Documentation of Processes and Systems	Review by the Steering Committee	DAU Program Director
2	Number of Courses Offered Using Technology-Based Delivery	1 Course	FY 98-10 courses FY 99-25 courses FY 00-50 courses	Number of Courses Offered	Review of DAU Course Catalog	DAU Program Director
3	Number of Members of the Acquisition Community Completing Courses	23,000	FY 98-15% increase FY 99-15% increase FY 00-15% increase	Completions per Year	Course Management Completion Data Files	DAU Operations Director
4	Average Cost per Learner per Course (for all DAU Courses)	\$1,330	FY 98-9% decrease FY 99-9% decrease FY 00-9% decrease	Cost per Learner per Training Event	DAU Financial Management Process	DAU Resource Management Director
5	Evaluation of Reaction, Learning, On-the-Job Behaviors, and Organizational Results	End-of-Course Feedback, Graduate and Supervisor Surveys	90% of Comments for Needed Improvement Acted Upon	Reaction, Learning, Behavior, and Organizational Results Evaluated for Certification and Assignment-Specific Courses	Course Evaluation Data for Levels 1-4 of the Kirkpatrick Evaluation Model	DAU Academic Affairs Director





# CURRICULUM TRANSITION PROCESS





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## OVERALL STRATEGY

The overall curriculum transition strategy is based on the February 27, 1997, mandate from the Under Secretary of Defense for Acquisition and Technology to use technology to deliver quality training to learners in a cost-effective way. This mandate accelerates the use of technology in course delivery by setting forth the following goals:

- ◆ At least 10 percent of DAU courses will be converted to the use of information age technologies before the end of FY 97, and
- ◆ An additional 15 percent will be converted by the end of FY 98.

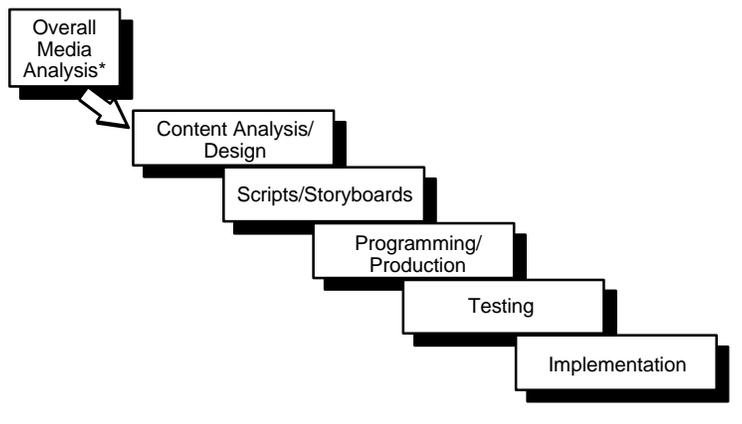
The mandate also has a stretch goal for DAU to offer all courses in a technological mode if analyses identify that cost savings will result without sacrificing quality.

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## INSTRUCTIONAL DESIGN APPROACH

To meet this mandate, the curriculum transition process must balance sound instructional design approaches with innovative techniques that allow for rapid prototyping. As illustrated below, each step in the rapid prototype model begins before the prior step is completed. For example, as soon as a high-level design is completed and a portion of the content is analyzed and validated, the project team begins developing storyboards. Production then begins on storyboards as they are approved.



Total Cycle Time = 6 to 9 Months

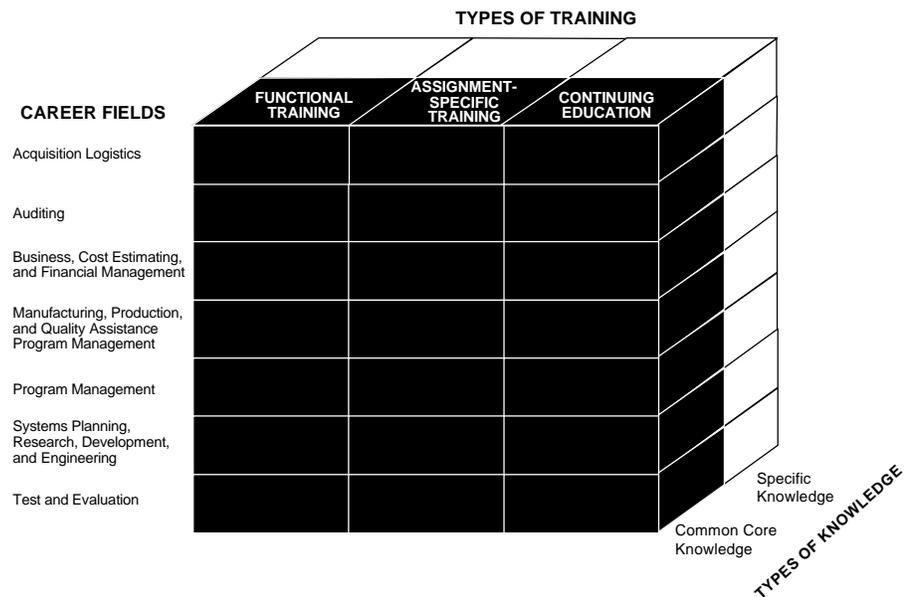
\* Note: The DAU President makes the final decision about media based on the performance outcomes, course objective, and input from the Implementation Team.

Rapid prototyping reduces potential risks by having stakeholders review materials early in the process when changes can be made more cost effectively. Early reviews of completed course materials can reduce the development cycle by at least one-third.

DAU CURRICULUM  
KNOWLEDGE BASE

Conversion to technology-based training methods will allow DAU to reuse common content elements across both certification and continuing-education courses. As illustrated below in Figure 2, a DAU curriculum knowledge base will be established. Course content will be organized into a database structure. The structure will allow courses to share common content areas if appropriate (see the shaded cells below). An example of a content area that may appear in the shaded cells is acquisition ethics because this topic is taught in all career fields and in all types of training courses. Course maintenance costs are less when common content areas are developed and maintained using this database approach.

Figure 2. DAU Knowledge Base



TRANSITION  
SCHEDULE

A sequence has been established for beginning the transition of courses to technology-based instruction. The following chart shows, by quarter, the number of courses for which the process will be initiated. Attachment B lists the course titles by quarters.

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
FY 97		5	5	5
FY 98	5	6	5	5
FY 99	6	5	6	6
FY 00	6	6		

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**Criteria**

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The following criteria were used to sequence the courses:

- ◆ Readiness of the content based on the DAU academic review cycle.
  - ◆ Highest potential return for reinvestment (learner quota times total number of training contact hours).
  - ◆ Clustering and sequencing of key content areas by levels and career fields.
  - ◆ Instructor, Functional Board, and DAU staff workload considerations.
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MEDIA SELECTION

DAU will use a media selection model based on the Multi-Attribute Matrix (MAUM) Model used at the United States Air University. This model was developed by Hannafin and Peck (1988).

The model uses a media rating system to analyze required learning levels and ranks alternative media options for delivery. After an orientation process and demonstrations of the potential uses of technology, each panelist will rate a series of statements about the course. Next, the facilitator will lead a discussion on the rating results. The panel will consider these comments and make final ratings. This process will take one day per course.

The facilitator will be an independent third party and will not be involved in the subsequent course transition efforts. The panel will present its recommendations to the DAU President. The DAU President will make the final media selection decision.

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MEDIA SELECTION  
CRITERIA

Listed below are sample criteria that will be used in the media selection process:

- ◆ Target Audience Characteristics: The target audience characteristics include the learning styles/preferences, motivation levels, and pretraining skill levels.
- ◆ Types of Performance Outcomes: A series of questions will be used to help panelists sort performance outcomes into psychomotor (procedural), cognitive (declarative), or affective domains.
- ◆ Levels of Outcomes: Performance outcomes will be rated on the levels of learning required and will be based on a modified version of Bloom's Taxonomy. The taxonomy will be expanded to include job performance dimensions.
- ◆ Learning Difficulty: The level of difficulty of the content will be rated.
- ◆ Types of Stimulus: The types of visual and auditory stimulus elements needed to learn the content and perform the job tasks will be identified.
- ◆ Group Versus Individual Performance: Each outcome will be identified as requiring group versus individual task performance.
- ◆ Instructor Feedback: The levels and types of instructor feedback needed for learning the content will be rated.

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MEDIA OPTIONS

Whenever it is feasible to do so, DAU will use multiple delivery options. The guiding principle is to “develop once and use many times and in many ways.” Media selections should allow for the maximum flexibility.

The Web-based delivered courses will be designed so that they can be repackaged as needed for stand-alone delivery on a CD-ROM. Video teletraining courses will be designed so that they can be delivered either in two-way video/audio or one-way video/two-way audio mode. In addition, Web-based resources will be used to support video teletraining.

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EVALUATION  
PROCESS

The purpose of the evaluation stage is to ensure that the learners can achieve the performance outcomes. Evaluation includes the following two phases:

- ◆ Formative Evaluation: Formative evaluation is the systematic collection of information for improving an instructional product before it is implemented fully.
- ◆ Summative Evaluation: Summative evaluation is an assessment of effectiveness of an instructional product after it has been implemented.

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*FORMATIVE EVALUATION:  
TECHNOLOGY-BASED  
TRAINING*

In a traditional design/development approach, formative evaluation is conducted after the instructional product has been developed fully. In developing technology-based products, formative evaluation should not wait until the end of the development process. DAU will conduct formative evaluations at the following key milestones:

- ◆ Content Analysis: The content analysis will be validated by Functional Board experts and instructors.
- ◆ Storyboards/Scripts: The content presented in these deliverables will be evaluated by Functional Board experts and instructors. DAU instructional staff will evaluate and recommend the instructional approach.
- ◆ Trials: As lessons are completed, formative evaluation sessions will be conducted with a representative sample of the target audience. This evaluation will focus on learning effectiveness and usability of the materials. A full operational trial will be conducted before the course is finalized.

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*SUMMATIVE EVALUATION:  
TECHNOLOGY-BASED  
INSTRUCTION*

Summative evaluation for technology-based instruction does not differ from summative evaluation conducted on other forms of instruction. A thorough summative evaluation should measure:

- ◆ Training Transfer: An assessment should be made to determine how well new knowledge and skills are applied in the work setting. (This type of evaluation is often referred to as Kirkpatrick's Level 3 evaluation.)
- ◆ Organizational Goals: An assessment should be made to determine if organizational goals have been met. (This type of evaluation is often referred to as Kirkpatrick's Level 4 evaluation.)

Currently, DAU conducts surveys to collect feedback on training transfer and organizational goal attainment from graduates and their supervisors.



# MANAGEMENT FRAMEWORK





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OVERALL STRATEGY

DAU will centrally manage the technology-based education and training program with involvement from key stakeholders. The overall management structure will have three primary objectives:

- ◆ Proactively identify, assess, and resolve technology-based education and training issues.
- ◆ Ensure solutions are integrated successfully into the ongoing operational environment.
- ◆ Measure achievement of metrics and implement a continuous improvement process.

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MANAGEMENT  
STRUCTURE

DAU will form a Steering Committee to implement the Technology-Based Education and Training Program. The following tables summarize the functions and memberships of these organizational structures.

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**Steering Committee**

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Functions: The Steering Committee's primary functions include:

- Resolving implementation issues affecting all stakeholders.
- Overseeing timely and effective implementation of the Technology-Based Education and Training Program.

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Membership: DAU President, Chair

Functional Board Executive Secretaries  
Directors for Acquisition Career Management (DACMs)  
Consortium School Leaders

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Additional information on the Steering Committee's responsibilities, areas of focus, and operating procedures can be found in the Implementation Plan document.



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**ROLES AND  
RESPONSIBILITIES OF  
KEY PLAYERS**

Summarized below are the roles and responsibilities of key players. Additional information on implementation responsibilities, areas of focus, and operating procedures can be found in the Implementation Plan document.

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**DAU Staff**

- Implement the Program.
- Identify new requirements and integrate them into the Program.

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**Functional Boards**

- Identify critical knowledge and skills requirements for career fields.
- Specify requirements for performance support systems.
- Provide functional experts for validation of the technical content.

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**Directors of Acquisition Career Management (DACMS)**

- Oversee timely and effective implementation of the Technology-Based Education and Training Program.
- Ensure that target learners have access to required technology-based courses.
- Track course registrations through new technology-based systems.
- Support efforts to market technology-based courses.

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**Consortium Members**

- Assign instructors to course development teams.
- Provide instructors to facilitate the delivery of technology-based education and training.
- Ensure and assess learning.
- Provide course updates.



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PROGRAM RISKS AND  
RISK REDUCTION  
STRATEGIES

DAU has identified the potential risks associated with achieving each program metric and developed strategies for minimizing those risks. The following tables summarize the risks and strategies.

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**Metric: Standard Operating Procedures and Systems Infrastructure Implemented**

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Risk: DAU is developing courses using emerging Web technologies. These technologies are evolving rapidly. A balance must be struck between standardizing procedures and systems and allowing for adaptation of these emerging technologies.

Strategy: To minimize risk, DAU has researched best practices followed by industry leaders, universities, and other Government agencies. (See the Technology-Based Education and Training Implementation Plan for a summary of this research.) DAU will base its standard operating procedures and systems on these best practices. In addition, DAU will institute a continuous improvement process to monitor procedures and systems implementation. DAU will assess the procedures and systems at least once each quarter. In addition, lessons learned and performance data will be collected for each course transition effort. Improvements to procedures and systems will be made on an as-needed basis.

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**Metric: Number of Courses Offered Using Technology-Based Delivery**

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Risk: DAU is planning to migrate a minimum of four to five courses to technology-based instruction per quarter. Keeping concurrent efforts on schedule, and within budget, is a potential management risk.

Strategy: To minimize risk, DAU will set up systems for overseeing concurrent course production. These systems will:

- Use rapid prototyping models to minimize risk by trying new techniques on small subsets of course materials.
  - Include a central database of design tools to maximize the reuse of course elements.
  - Assign functional experts and instructors to each team to ensure the integrity of the content as it is being developed.
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PROGRAM RISKS AND  
RISK REDUCTION  
STRATEGIES  
(CONTINUED)

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**Metric: Number of Members of the Acquisition Community  
Completing Courses**

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Risk: There are two risks associated with achieving this metric. First, potential learners must be made aware that courses can be accessed using technology-based instruction. Second, systems must be in place to encourage learners to complete courses after they enroll in them.

Strategy: To minimize the first risk, DAU is implementing marketing techniques to communicate information about technology-based courses to potential target audiences. Second, to ensure a high course completion rate, DAU is:

- Developing an aggressive marketing campaign.
  - Implementing automatic tracking of course completion rates, and personalized notices to remind learners about course completion timeframes.
  - Developing supervisor tips for fostering technology-based learning in the workplace.
  - Pilot testing all courses with representatives of the target population to ensure that instructional methods will engage learners and will motivate them to complete the courses.
  - Providing a toll-free helpline to assist learners.
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**Metric: Average Cost per Learner per Course**

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Risk: The potential risk is that costs will be higher than anticipated.

Strategy: To minimize this risk, DAU:

- Has developed detailed cost schedules and tracking procedures for all course transition activities.
  - Has created a strategy for financing curriculum transition efforts through reinvestment of savings gained from delivering courses in a technology-based mode.
  - Has tested the reinvestment model on seven selected courses.
  - Is establishing Memorandums of Understandings (MOUs) with other governmental organizations to capitalize on existing resources (e.g., video teletraining sites).
  - Is outsourcing activities to obtain the best value.
  - Is establishing a configuration management process for the review/approval of all proposed systems changes.
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PROGRAM RISKS AND  
RISK REDUCTION  
STRATEGIES  
(CONTINUED)

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**Metric: Evaluation of Reaction, Learning, and On-the-Job Behaviors**

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Risk: The potential risk is that evaluation data are not available for determining if learning has occurred.

Strategy: To minimize this risk, DAU is implementing formative and summative evaluation processes based on the Kirkpatrick Four-Level Evaluation Model. DAU will:

- Measure reaction (Level 1), learning (Level 2), and on-the-job behaviors (Level 3) for all technology-based courses.
  - Measure organizational results (Level 4) for the entire program.
  - Develop action tracking systems and follow up on all evaluation results that suggest the need for improvements.
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# RESOURCE MANAGEMENT





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OVERALL STRATEGY

The overall resource management strategy for implementing this Plan is to capitalize on existing human and financial resources. This section summarizes how DAU plans to manage these resources.

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HUMAN RESOURCES

Studies of successful distance learning projects consistently stress the importance of training and supporting instructors while they transition from classroom to technology-based instruction. DAU will establish systems to select, train, and support instructors.

Listed below are sample strategies that DAU will use to prepare administrative staff and instructors for technology-based delivery of courses:

- ◆ Guides: Guides will contain step-by-step instruction on how to use the new technologies.
- ◆ Workshops: Workshops will be offered to introduce and demonstrate the use of the new technologies.
- ◆ Coaching: Coaching will be conducted by contracted personnel. Course transition efforts will include tasks for supporting instructors during the first offering of a course and on an as-needed basis after that.
- ◆ Web-Based Instructor Resources: DAU will create a Web site where instructors can learn more about technology-based instruction by downloading documents, exchanging information, and accessing other technology-based training sites.
- ◆ Information Push Systems: DAU will employ "push systems" for sending information/messages to administrative staff and instructors based on the topic areas taught or the types of technology used. (Example: Pointcast™ news distribution on the Web.)

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FINANCIAL  
RESOURCES

Most technology-based training programs require a significant up-front investment in technologies to accommodate course deliveries. These startup costs range from satellite uplinks and downlinks to the procurement of customized Web servers and user or learner platforms. DAU's program, however, will take advantage of a vast video teletraining network, existing consortium computer resources, and computer systems available to the acquisition workforce. Course design will optimize these existing delivery resources and avoid large startup costs traditionally associated with these types of programs.

By virtue of the accelerated schedule outlined in the Technology-Based Education and Training Implementation Plan, DAU has the unique potential to reinvest resources planned for classroom delivery to support the transition of classroom-based training to technology-based delivery.

This "reinvestment" approach is unique because the majority of Government-initiated distance education programs take years to realize quantifiable cost savings/cost avoidance.

DAU's expected course loadings for acquisition training exceed the normal Government training environment. Because DAU provides training to an unusually large number of individuals per course, the rate of return on each converted course can be realized within 12 months. However, this return is dependent upon two key factors: (1) cost and time to develop each converted course, and (2) learner throughput for the courses.

Therefore, it is safe to assume that a successful reinvestment strategy can be adopted that focuses on the quantifiable dollars associated with cost avoidance derived from reduced and/or eliminated learner and instructor travel and per diem. DAU will use the cost avoidance to expand the University's course transition capabilities and technological infrastructure to deliver more training (increasing capacity 15 percent per year) while maintaining level program funding.

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REINVESTMENT  
STRATEGY

DAU will use the following reinvestment strategy:

- ◆ DAU will use current FY 97 budget resources to begin the conversion of FY 97 and FY 98 courses. The initial course(s) will be used to examine the effectiveness of the proposed course delivery scenarios and provide a baseline for required personnel requirements and expected costs associated with these delivery alternatives. During this evaluation period, the classroom-based alternatives will still be offered to accommodate requirements that precede the complete transition of these courses to technology-based delivery.
- ◆ Upon completion of this evaluation period, DAU will have compiled sufficient cost data (and conversion time estimates) to develop individual course comparison scenarios, along with an accurate conversion schedule for the remainder of DAU courses. These comparison models will be used to extrapolate the expected delivery costs (DAU funded) over the outstanding DAU courses per fiscal year.
- ◆ The current DAU POM request for FY 99 and FY 00 has sufficient resources to cover the delivery of converted FY 97 and FY 98 technology-based courses and the conversion of the remaining courses from FY 99 through FY 01.
- Once the aforementioned model for technology-based courses has been refined and validated, the course conversion “waterfall” will be revised to enable DAU to use projected classroom-based budgets in FY 99, and the out-years for technology-based course conversion and delivery requirements.

DAU is confident that the returns associated with this program will more than justify the startup costs required for its inception.





# SYSTEMS INFRASTRUCTURE MANAGEMENT





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OVERALL STRATEGY

DAU will centrally manage a single, integrated systems infrastructure to support technology-based education and training requirements. Training and education requirements will drive the design of the systems infrastructure.

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OPERATING  
PRACTICES

DAU will develop the proposed systems architecture in accordance with DoD and industry standards for open systems, interoperability, and reuse. The architecture will be based on the following key system development concepts:

- ◆ Interoperability: DAU will ensure interoperability through compliance with DoD Technical Architecture for Information Management (TAFIM) and Joint Technical Architecture (JTA) strategies.
- ◆ Commercial-Off-The-Shelf (COTS) Products: DAU will maximize the use of COTS and Nondevelopmental Items as required by the DoD 5000 series directives and instructions.
- ◆ Software Reuse: DAU will create a database to allow for reuse of cross-cutting content elements, programming code, graphics, and other elements that can be used in the majority of courses.
- ◆ Common Data and Object Environments: DAU will comply with the common data and object environments initiatives.
- ◆ Disciplined Systems Development and Rapid Prototyping Development Methodologies: DAU will strike a balance between disciplined systems development and rapid prototyping development methodologies. Existing task order contracts will be used to speed the process and ensure fair competition at best value.

DAU will not attempt to develop new in-house telecommunications or systems support infrastructure, but will obtain such services from existing Government or commercial providers.

Recognizing the rapid advances in technology, DAU will plan for evaluating and integrating technologies as they mature, avoiding investments that will likely be overtaken before recovering their costs.



▼ ATTACHMENT A

EFFECTIVENESS OF  
DISTANCE LEARNING





The following studies on the effectiveness of Distance learning were compiled by Thomas L. Russell, North Carolina State University, Director, Office of Instructional Telecommunications.

Date, Author, Study Title	Finding
1996 Garson, G. D. The Political Economy of Online Education. (unpublished paper) North Carolina State University.	"Studies of computer-mediated education in university settings do not find they 'speed up' learning or make students 'perform better.' Typically, evaluation studies find no difference with traditional education."
1996 Goldberg, M. W. CALOS: First Results From an Experiment in Computer-Aided Learning. University of British Columbia, Canada.	"Students that had access to only WWW-based material or the lectures performed roughly the same. It is encouraging that it seems possible for a WWW-based offering to be as effective as a traditional lecture-based course."
1996 McClure, P. A. Technology Plans and Measurable Outcomes. Educom Review, (May/June) Vol. 31, No. 3, 29-30.	"One reason why online education is 'supposed' to be less expensive education in the minds of many administrators is because evaluation studies do not show it to be pedagogically more effective..."
1996 Moore, M., and Kearsy, G. Research on Effectiveness. Chapter 4-Distance Education: A Systems View. Wadsworth Publishing, ISBN 0-534-26496-4.	"Comparing the achievement of learners (as measured by grades, test scores, retention, job performance) who are taught at a distance and those taught in face-to-face classes is a line of research going back more than 50 years. The usual finding in these comparison studies is that there are no significant differences between learning in the two different environments, regardless of the nature of the content, the educational level of the students, or the media involved...reasonable to conclude (1) there is sufficient evidence to support the idea that classroom instruction is the optimum delivery method; (2) instruction at a distance can be as effective in bringing about learning as classroom instruction; (3) the absence of face-to-face contact is not in itself detrimental to the learning process; and (4) what makes any course good or poor is a consequence of how well it is designed, delivered, and conducted, not whether the students are face-to-face or at a distance."
1996 Wilson, D. L. Self-Paced Studies. Chronicle of Higher Education, Vol. XLII, No. 21 (Feb. 2) A19-A20.	"Grades and performance of the online learners proved neither better nor worse on the average than traditional section students."
1996 Witherspoon, J. P. A "2+2" Baccalaureate Program Using Interactive Video. DEOSNEWS, Vol. 6, No. 6, ISSN 1062-9416. Pennsylvania State University.	"...the average grades of Fountain Valley classes were marginally to half-a-grade better than those of their campus-bound counterparts."
1995 Barry, M., and Runyan, G. A Review of Distance-Learning Studies in the U. S. Military. The American Journal of Distance Education, 9(3): 37-47.0	"All studies in the table reported no significant differences between resident and distant groups. It appears from the studies reviewed here that student achievement in distance learning courses is comparable to student achievement in resident courses...Studies conducted in military settings tend to show no significant difference in achievement between distance learners and resident learners..."
1995 Dexter, D. J. Student Performance Based Outcomes of Televised Interactive Community College Distance Education. Doctoral dissertation, Colorado State University.	"There is no significant difference between the campus-based students and the distance learners in terms of final course grades."
1995 Hiltz, S. R. Impacts of College-Level Courses via Asynchronous Learning Networks: Focus on Students. Sloan Conference on Asynchronous Learning Networks. Philadelphia	"In looking at how interesting the course content was, the differences among delivery modes are not significant...results [grades] support the hypothesis of equal or better performance. Some preliminary results for all courses showed no significant differences...Once again, as for the combined results, there are no statistically significant differences..."
1995 Hodge-Hardin, S. L. Interactive Television in the Classroom: A Comparison of Student Math Achievement Among Three Instructional Settings. Doctoral dissertation, East Tennessee State University.	"Results showed no significant difference in math achievement among the three groups. There were also no differences in student attitudes toward enrolling in future ITV courses when comparing the host site with the remote site..."



Date, Author, Study Title	Finding
1995 McCleary, I. D., and Egan, M. W. Program Design and Evaluation: Two-Way Interactive Television. Video-Based Telecommunication in Distance Education, Pennsylvania State University, Readings in Distance Education, Number 4.	"...off-campus students were compared to on-campus students...Neither group was significantly different from the other on their pre-test performance. The same is true of both groups on the objective post-test measure. The t-test revealed no significant difference between the groups..."
1995 Sorensen, C. K. Evaluation of Two-Way Interactive Television for Community College Instruction. ACEC Conference, Ames, Iowa.	"...there are generally no differences in achievement between students in traditional classes and those in distance-delivered classes, or between distance students at remote sites and those at origination sites where a teacher is present."
1995 Souder, W. E. The Effectiveness of Traditional Vs. Satellite Delivery in Three Management of Technology Master's Degree Programs. Video-Based Telecommunication in Distance Education, Pennsylvania State University, Readings in Distance Education, Number 4.	"This study has shown that distance learners can perform as well as or better than traditional learners in management of technology master's degree programs, as measured by exams, term papers, and homework assignments."
1994 Flaskerud, G. The Effectiveness of an Interactive Video Network IVN Extension Workshop. DEOSNEWS, Vol. 4, No. 9, ISSN 1062-9406, Pennsylvania State University.	"Participants in the IVN workshop learned marketing concepts as well as those in the regular workshop."
1994 Gerhing, G. A Degree Program Offered Entirely On-Line: Does It Work? Tel-Ed '94 Conference Proceedings, pp. 104-106.	"...the on-line education programs at the University of Phoenix are proving to be equally as effective (and in many cases, more so) as the real-time classes taught on campus."
1994 McGreal, R. Comparison of the Attitudes of Learners Taking Audiographic Teleconferencing Courses in Secondary Schools in Northern Ontario. Interpersonal Computing and Technology: An Electronic Journal for the 21st Century, pp. 11-23.	"The results of this study support the original hypothesis that there would be no significant difference among the students taking distance education courses...there really is no significant difference between the remote and non-remote groups."
1994 Scheidman, K. Respiratory Therapy Technician Program: Evaluation of Technical Program. California College of Health Sciences, unpublished.	"...89% of the employers considered the performance of CCHS [primarily print-based] graduates to be the 'same' or 'better' than that of graduates of other programs [classroom-based]."
1994 Schlosser, C. A., and Anderson, M. L. Distance Education: Review of the Literature. Research Institute for Studies in Education, Iowa State University.	"...students learn equally well from lessons delivered with any medium, face-to-face or at a distance...hundreds of media comparison studies that indicated, unequivocally, that there is no inherent significant difference in the educational effectiveness of media...Further comparison of the effectiveness was not needed. The specific medium does not matter...Students learning at a distance have the potential to learn just as much and as well as students taught traditionally."
1994 Threlkeld, R., and Brzoska, K. Research in Distance Education. Distance Education: Strategies and Tools. Educational Technology Publications.	"Studies of media preference are common in comparing face-to-face instruction to telephone-based instruction. In general, there are no differences in preferred media. When faced with the option of traveling to a live class, students prefer learning by telephone."
1993 Jurasek, K. A. Distance Education via Compressed Video: An Evaluation of the Attitudes and Perceptions of Students and Instructors. Iowa State University.	"...students at the distance classroom had a significantly more positive attitude than students at the origination site. There was no significant difference in the average grades earned by the students at the two sites."
1993 Knott, T. D. Distance Education Effectiveness. U. S. Distance Learning Association ED Journal, J7-16.	"...in the French IV class...no difference was found between the traditionally taught students and all DE students...There was no difference found in mean final grade between the traditional class and the DE-primary class."



Date, Author, Study Title	Finding
1993 Souder, W. F. The Effectiveness of Traditional Vs. Satellite Delivery in Three Management of Technology Master's Degree Programs. The American Journal of Distance Education, Vol. 7, No. 1.	"This study has shown that distance learners can perform as well as or better than traditional learners in management of technology master's degree programs, as measured by exams, term papers, and homework assignments. Thus, this study adds to the burgeoning evidence that distance learners should not be viewed as disadvantaged..."
1992 Bauer, J. W., and Rezabek, L. L. The Effects of Two-Way Visual Contact on Student Verbal Interactions During Teleconferenced Instruction. AECT National Convention Research and Theory Proceedings.	"...no significant differences between the audio and the traditional [face-to-face] group in either restricted or expanded thinking questions...no significant differences between the audio and the audio-video group, or between the audio and the traditional group."
1992 Dillon, C. and Walsh, S. The Comparative Learning Benefit of One-Way and Two-Way Videoconferencing for Distance Education Applications. The University of Oklahoma.	"Few found significant differences in learning benefit..."
1992 Figueroa, M. L. Understanding Students Approaches to Learning in University Traditional and Distance Education Courses. Journal of Distance Education, 7(3), 15-28.	"There were no significant differences in reading achievement between the two groups."
1992 Jones, J. I., Simonson, M., Kemis, M., and Sorensen, C. Distance Education: A Cost Analysis. Iowa State University of Science and Technology.	"...distance education is effective when effectiveness is measured by achievement, by attitudes, and by cost-effectiveness...Student achievement in interactive distance education classes has been as good as or better than that of students learning from traditional teaching methods."
1992 Olcott, D. Instructional Television: A Review of Selected Evaluation Research. Oregon State University.	"Most studies comparing traditional classroom instruction with ITV have shown no significant differences in student achievement...instructional television appears to produce comparable academic achievement to traditional classroom instruction."
1992 Russell, T. L. Television's Indelible Impact on Distance Education: What We Should Have Learned From Comparative Research. Research in Distance Education.	"No matter how it is produced, how it is delivered, whether or not it is interactive, low-tech or high-tech, students learn equally well with each technology and learn as well as their on-campus, face-to-face counterparts..."
1992 Simpson, H., Pugh, H., and Parchman, S. Use of Video-Teletraining to Deliver Hands-on Training: Concept Test and Evaluation. TN-92-14. San Diego, CA: Navy Personnel R&D Center.	"...observations indicated that the learning processes occurring in the off-line laboratories were very similar to those in traditional resident laboratories."
1992 Thompson, A. D., Simonson, M. R., and Hargrave, C. P. Educational Technology: A Review of the Research. Association for Educational Communications and Technology.	"Many media practitioners who had a professional interest in demonstrating the superiority of mediated instruction were stunned to read that research indicated that instructional media were not inherently 'better'...The literature clearly demonstrates that for every study that shows the new medium is better, another study shows the opposite."
1992 Williams, A. T. The Efficacy of Premium Broadband Video Conferencing in Teaching Cardiac Arrest Skills: A Comparative Study. Columbia Pacific University, Dissertation.	"Statistical analysis of the data showed that there was no difference in performance of the two skills between those who received in-class instruction and those who received instruction through video conferencing."
1991 Cheng, H. C., Lehman, J., and Armstrong, P. Comparison of Performance and Attitude in Traditional and Computer Conferencing Classes. The American Journal of Distance Education. 5(3), 51-64.	"...no significant differences between the treatment groups examined in the study. Further, at the end of the course, there were no significant differences among the groups in attitude toward the subject matter."



Date, Author, Study Title	Finding
1991 Dillon, C. L., and Harwell, D. Tele-communications in Oklahoma: A Summary of Research. The University of Oklahoma.	"Historically, the introduction of each new medium of instruction is accompanied by research designed to determine if it is as effective as traditional instruction...Each new wave of comparison studies brings similar results--no significant difference..."
1991 Gehlauf, D. N., Shatz, M. A., and Frye, T. W. Faculty Perceptions of Interactive Instructional Strategies: Implications for Training. The American Journal of Distance Education, Vol. 5, No. 3.	"One of the first issues to be investigated was whether students were getting the same education in the technologically delivered classes as in the traditional classroom...there are no significant differences in academic performance for students in the two settings."
1991 Johnson, J. L. Evaluation Report of the Community College of Maine Interactive Television System. University of Southern Maine.	"No significant differences (p<.01) were found between the students in origination sites and those in receive sites."
1991 McNeill, B. J., and Nelson, K. R. Meta-analysis of Interactive Video Instruction: A Ten-Year Review of Achievement Effects. Journal of Computer-Based Instruction, Vol. 18, No. 1, pp. 1-6.	"...there were no significant differences in achievement between students using only videodisc and students using videotape-based units."
1991 Phelps, R., et al. Effectiveness and Costs of Distance Education Using Computer-Mediated Communication. American Journal of Distance Education, 5(3), 7-19.	"Test scores, completion rates, student perceptions, and costs were compared to resident training, and results of instruction by CMC were found to be no different from that of resident instruction."
1991 Simpson, H., Pugh, H., and Parchman, S. Empirical Comparison of Alternative Video Training Technologies. Technical Report-92-3. San Diego, CA: Navy Personnel R&D Center.	"...student achievement was higher and comparable to live instruction with fully-interactive VTT...Student achievement was not higher in the two-way video class when compared to the one-way video class..."
1991 Thomas, R., and Hooper, E. Simulations: An Opportunity We Are Missing. Journal of Research on Computing in Education, Vol. 13, No. 4, pp. 497-513.	"...no difference in knowledge gained when compared to other methods of instruction."
1990 Cennamo, K. S. Squenye, and Smith, P. L. Can Interactive Video Overcome the "Couch Potato" Syndrome? AECT National Conversion Research and Theory Proceedings.	"...although it was predicted that learners would perceive that they invested more mental effort in processing the IV lesson than in processing the ITV lessons and TV lesson, and that learners would perceive that they invested more mental effort in processing an ITV lesson than in processing a TV lesson, there was no significant difference between the three groups."
1990 Hahn, H. Distributed Training for the Reserve Component: Remote Delivery Using Asynchronous Computer Conferencing. Report No. 2Q263743A794. Boise, ID: Army Research Institute.	"The evaluation found that...there were no differences between resident and ACC students on objective performance measures."
1990 Huffington, D. D., and Young, R. C. Integrating Video Technology into Independent Study: The Missouri Experience. The American Journal of Distance Education, Vol. 4, No. 2.	"...research continues to indicate there is no significant difference in what students learn whether they are in large or small classes, participating in telephone or video conferences, or studying alone in an independent study course."
1990 Kabat, E. J., and Friedel, J. N. The Eastern Iowa Community College Districts Televised Interactive Education Evaluation Report. Eastern Iowa Community College.	"The students at the remote sites received grades an average of .01 lower on a 4.0 scale than students at the origination sites. This was not a significant difference."
1990 Moore, M. G., and Thompson, M. M. The Effects of Distance Learning: A Summary of Literature. American Center for the	"...good teaching by teleconferencing and other distance education techniques has results no better or worse than good teaching by any other method, including good face-to-face instruction."



Date, Author, Study Title	Finding
Study of Distance Education.	
1990 Rupinski, T. and Stoloff, P. An Evaluation of Navy Video Teletraining (VTT). CRM 90-36. Alexandria, VA: Center for Naval Analyses.	"There were very small, nonsignificant differences in course outcomes between the two groups, and there were no differences between the two groups in the number of course failures."
1990 Simpson, H., Pugh, H., and Parchman, S. A Two-Point Video-Teletraining System: Design, Development, and Evaluation. Navy Personnel R&D Center. Technical Report-90-5.	"Student performance on examinations was comparable in originating and remote classrooms, and student attitudes were similar at both sites."
1990 Stone, H. R. Candid Classroom ITV: An Evaluation of its Effectiveness. University of Delaware.	"Color seems not to increase learning...Students like a talk-back system but seem to learn no more with it than without it...No learning advantage has been demonstrated for 'professional' or 'artistic' production techniques...Eye contact seems not to contribute to learning...adding humor adds not to learning effect."
1990 Stone, H. R. Does Interactivity Matter in Video-Based Off-Campus Graduate Engineering Education? University of Delaware.	"...students do not suffer from the inability to talk back to faculty in real time...distance students perform better where they control not only where but when learning occurs."
1989 Barker, B. O., Frisbie, G., and Patrick, K. R. Broadening the Definition of Distance Education in Light of the New Telecommunications Technologies. The American Journal of Distance Education, Vol. 3, No. 1	"The research base, though scant at present, suggests the students who study via telecommunicated distance education approaches perform as well as their counterparts in traditional classroom settings..."
1989 Barker, B. O. and Platten, M. R. Student Perceptions on the Effectiveness of College Credit Courses Taught via Satellite. Readings in Distance Learning and Instruction No. 2, 104-110, Pennsylvania State University.	"Most students (53.8 percent) felt that televised instruction via satellite maintained their interest as well as did regular classroom instruction."
1989 Beare, P. L. The Comparative Effectiveness of Videotape, Audiotape, and Telelectures in Delivering Continuing Teacher Education. Moorhead State University.	"...individual instructional formats had little effect on student achievement or course evaluation...the lack of individual opportunity to interact on a daily basis with the instructor did not reduce student learning..."
1989 Chute, A. G., Balthazar, and Poston, C. O. Learning from Teletraining. Readings in Distance Learning and Instruction No. 2, 87-96, Pennsylvania State University.	"Students appeared to learn from the teletraining mode as well, if not better, than they did from the face-to-face mode."
1989 Gibbons, M. The Effectiveness of Technology Applied to Instruction: A Summary of the Research Literature. San Diego State University.	"...listed a half-dozen studies from [the 1930's and 1940's] which demonstrated no difference in student performance between those who listened to radio lectures and those who attended live classes."
1989 Grimes, P. W., Nielsen, J. E., and Niss, J. F. The Performance of Nonresident Students in the "Economics U\$A" Telecourse. Readings in Distance Learning. Pennsylvania State University.	"...no significant differences were uncovered between either of the distant learner groups exposed to 'Economics U\$A' and the control group."
1989 Ritchie, H., and Newby, J. Classroom Lecture/Discussion vs. Live Televised Instruction: A Comparison of Effects on Student Performance, Attitudes, and Interaction. American Journal of Distance Education.	"Studies completed during the past three decades indicate performances by students on achievement-type tests are similar regardless of instruction proximity...comparable performance can be expected from students."
1989	"The students who saw the lessons on tape felt they did not learn the material as



Date, Author, Study Title	Finding
Russell, T. L. A Study of Foreign Language Instruction Via TOTE. Research in Distance Education, Vol. 1, No. 2, pp. 2-4.	well as they would have in a traditional classroom setting. However, their test scores were not significantly different from those of the traditionally taught group."
1989 Seigel, A. E., and Davis, C. Delivering Undergraduate Engineering Courses on Television: How Do Grades Compare? University of Maryland.	"...the grade performance of the on-campus student is statistically indistinguishable from that of the off-campus TV student."
1989 Silvernail, D. L., and Johnson, J. L. Evaluative Research Studies of the University of Southern Maine Instructional Television System. University of Maine.	"...no significant differences in the achievement or attitudes of students receiving live classroom instruction and those receiving some type of televised instruction. Overall, no significant differences were found in the achievement levels...no significant differences in end of course grades between ITV and non-ITV classes...no significant differences in grades between the origination site and remote sites...students do equally well in courses taught over the ITV system as they do in a traditional classroom setting. Students learned course content generally well...Students receiving their course instruction by means of interactive television learned as well as students in a traditional classroom."
1989 Timmons, K. Educational Effectiveness of Various Adjuncts to Printed Study Material in Distance Education. Research in Distance Education, Vol. 1, No. 3, pp. 12-13.	"...an examination of the students' grades indicates no apparent advantage at all..."
1989 Whittington, N. Is Instructional Television Educationally Effective? A Research Review. Readings in Principles of Distance Education. Pennsylvania State University.	"...students taking courses via television achieve, in most cases, as well as students taking courses via traditional methods...Television is a technological device for transmitting communication and has no intrinsic effect, for good or ill, on student achievement. Effective instructional design and techniques are the crucial elements in student achievement whether instruction is delivered by television or by traditional means."
1988 Annenberg/CPB Project. Teaching Telecourses: Opportunities and Options: How Do Telecourses Compare to Other Types of Courses? PBS Adult Learning Service.	"...television-delivered instruction is equivalent to traditional, classroom-based instruction in its learning effectiveness... outcomes of the television courses are roughly equivalent to the outcomes of the comparable traditional courses...telecourse students performed better than or as well as non-telecourse students...a third of the faculty studied reported that Annenberg/CPB courses retained more students than traditionally taught courses. Another third said that retention was equal to traditionally taught courses."
1988 Atherton, J., and Buriak, P. Video Simulation as a Computer Applications Instructional Technique for Professionals and Students. Journal of Vocational Education Research, Vol. 13, No. 3, pp. 59-71.	"...video can be just as effective or more effective than other forms of instruction."
1988 Chute, A. G., Balthazar, L. B., and Posten, C. O. Learning from Teletraining. The American Journal of Distance Education: Vol. 2, No. 3.	"Students appeared to learn from the teletraining mode as well as, if not better than, they did from the face-to-face mode."
1988 Gibbons, J. F. Tutored Videotape Instruction: An Approach to Educational Productivity. Stanford University.	"...the combined data show that the ITV method was at least as good as live instruction."
1988 Grimes, P. W., Neilsen, J. E., and Niss, J. F. The Performance of Nonresident Students in the "Economics U\$A" Telecourse. The American Journal of Distance Education, Vol. 2, No. 2, pp. 36-41.	"...neither distant learner group experienced a significant change in their attitudes towards economics. No significant difference is found between the off-campus and long distance groups...no significant differences were uncovered between either of the distance learner groups exposed to 'Economics U\$A' and the control group."
1988 Stone, H. R. Variations in Characteristics and Performance Between On-campus and Video-Based Off-Campus Engineering Graduate Students. University of Massachusetts.	"...no significant differences between on-campus and off-campus degree students regarding performance."



Date, Author, Study Title	Finding
1988 Woodward, D. B. Teaching Instructional Media Utilization: Video Tape Package vs. Classroom Instruction. Illinois State University.	"...there was no statistically significant difference between the mean score achieved by students who received instruction from the Instructional Media Utilization Package and...by students who received only classroom instruction..."
1987 Grimes, P., Niss, J., and Nielsen, J. An Evaluation of Learning and Attitudinal Changes of Students in Economics USA. The Annenberg/CPB Project.	"...for the spring semester, no significant differences in learning are found between the groups..."
1987 Kataoka, H. C. Long Distance Language Learning: The Second Year of Televised Japanese. North Carolina State University.	"...no statistically significant differences... students can learn Japanese as well as students in regular classes...performance is not lower."
1987 Kitchen, W. Education and Telecommunications: Partners in Progress. Testimony before the U.S. Senate Committee on Labor and Human Services.	"...in a wide range of elective programming provided from 1983 to 1986, no statistically significant differences in achievement were found between students taking courses traditionally or by..."
1987 Murray, J. and Heil, M. Project Evaluation: 1986-87 Pennsylvania Teleteaching Project. Mansfield University, Pennsylvania.	"...the pattern of scores across seven courses justifies the conclusion that receiving (distant) students do at least as well and perhaps better than their sending-site counterparts and nonteleaching control students."
1987 Valore, L., and Diehl, G. The Effectiveness and Acceptance of Home Study. National Home Study Council, Washington, DC.	"All of the research published since 1920 has indicated that correspondence students perform just as well as, and in most cases better than, their classroom counterparts."
1987 Whittington, N. Is Instructional Television Educationally Effective? A Research Review. The American Journal of Distance Education, 1, 47-57.	"...a three-year study...which compared the performance of full-time Stanford students and students obtaining instruction via the live, interactive ITFS system...16,652 students taking traditional, on-campus instruction scored a mean GPA of 3.40, while 1,771 students taking live, interactive video instruction have a mean GPA of 3.39. In addition...Stanford is using tutored video instruction...Research indicates that this method...also promoted equivalent student achievement..."
1986 Bates, A. W. Learning From Television. Open Learning for Adults, Longmans.	"...students can learn just as well, if not better from television...There is a good deal of research which suggests that content may be learned just as well through television as through print."
1986 Bates, A., and Couell, R. N. Distance Education: An Overview Northwest Regional Educational Laboratory	"...students learn as well in distance education programs as they do in regular programs..."
1986 Bergin, V. Letter to Nil Whittingham. June 5 (unpublished).	"Television instruction is neither superior nor inferior to traditional classroom presentation. The question is not which medium works best, but what is effective instruction?"
1986 Carvalho, G. F., Graham, G. H., and Gray, M. A. An Evaluation of Telecourse Delivery of a Basic Management Class: A Comparison of Performance and Attitudes With Day and Evening Sections. Wichita State University and Beech Aircraft Corporation.	"The study concluded that while telecourse students might not have liked some aspects of the telecourse as well as the more traditional delivery modes, they performed as well as day and evening students on traditional tests."
1986 Chute, A., Hulick, M., Messmer, C., and Hancock, P. Teletraining in the Corporate Environment. Tele-conferencing and Electronic Communications. University of Wisconsin-Madison.	"...research conducted by Sales and Marketing Education Division has shown teletraining was as effective and in some cases more effective than face-to-face instruction. In general, there were no significant differences between the amount of information students learned in classes that were teletrained and the amount they learned in face-to-face instruction."
1986 Creswell, K. W. Does Instructional TV Make the Grade? Journal of Educational Television, Vol. 12, No. 1.	"Were the 'live' and 'TV' groups different in course performance or attitudes? The data...indicate that they were not; statistical tests (t-tests, Chi-square) applied to all...items showed no significant differences (at the p is less than or equal to .05



Date, Author, Study Title	Finding
	level) between the responses in 'live' sections and 'TV' sections...When we conduct telephone surveys in several courses and statistical tests on the data and find no significant difference between 'TV' and 'live' groups, we conclude that students can learn as well as they learn with professors present."
1986 Kataoka, H. C. Televised Japanese Language Program: The First Year. Foreign Language Annuals, Vol.19, No. 6.	"...students taught under TJaLP can learn as well as those taught in the regular classroom...no statistical significance emerged between the two groups..."
1986 LaRose, R. Adoption of Telecourses: The Adoption and Utilization of Annenberg/CPB Project Telecourses. The ELRA Group, Incorporated.	"...faculty reported that telecourse students performed better than or as well as non-telecourse students..."
1986 Pease, P. The Evaluation of the TIIN Network's Satellite-Based Education Network: A Preliminary Report. TI-IN Network. 3 June.	"...student achievement has been consistent with that experienced in traditional classes."
1986 Stone, H. Non-Tutored Video Instruction in Graduate Engineering Education. University of Massachusetts.	"There are no significant differences in graduate performance between traditional and video-based degree students..."
1985 Ellis, L., and Mathis, D. College Students Learning From Televised versus Conventional Classroom Lectures: A Controlled Experiment.	"Learning under the two lectures modes was statistically equivalent and class attendance was unaffected by the mode of instruction."
1985 Kirkhorn, J. A Teletraining Study: Student Learning Preferences. University of Wisconsin-Madison.	"...no significant difference in student satisfaction between a telephone-based course and a face-to-face course."
1985 Michael, W. B., and Knapp-Lee, L. Evaluating Learning in Telecourses. Coastline Community College.	"In some instances students recorded gains larger than the on-campus students; however, in general the results indicated no significant differences."
1985 Nelson, R. N. Two-Way Microwave Transmission Consolidates, Improves Education. NASSP Bulletin.	"Teachers and administrators in Iowa's two-way interactive television (TWIT) project found no significant differences between TWIT classes and other sections of the same class taught face-to-face by the same teacher."
1985 Research Communications, Ltd. Research on Student Uses of the Annenberg/CPB Telecourses for the Fall of 1984. Annenberg/CPB Project.	"...performance level equaled that experienced in other on-campus courses. This finding held true for students in both two-year and four-year institutions."
1985 Robinson, R. An Investigation of Technical Innovation: Interactive T.V. AECT.	"...students in remote interactive television classes achieved as well on post-tests as did students in traditional classrooms."
1985 Robinson, R. S., Collins, K. M., and West, P. C. Share Advanced [Secondary] Courses With Other Schools via Interactive Cable Television. Northern Illinois University.	"Students in interactive-television classes achieved as well on the post-test as did students in 'live' classrooms."
1984 Denton, J. J., et al. An Examination of Instructional Strategies Used With Two-Way Television. Texas A and M University.	"...achievement scores were at least as high on materials presented over two-way television as they were on materials presented with the professor present in the classroom."
1984 Kuramoto, A. Teleconferencing for Nurses: Evaluating Its Effectiveness. Teleconferencing and Electronic Communications III. University of Wisconsin-Madison.	"Nurses had comparable achievement regardless of the medium."



Date, Author, Study Title	Finding
1984 Partin, G., and Atkins, E. Teaching Via the Electronic Blackboard. Teleconferencing and Electronic Communications IV 68-73.	"...student achievement was comparable to achievement resulting from resident instruction."
1984 Weingand, D. E. Telecommunications and the Traditional Classroom: A Study of the Delivery of Education. University of Wisconsin.	"...1) there is no evidence to support the idea that face-to-face instruction is the optimum delivery method, 2) Instruction by teleconferencing can facilitate learning as well as or better than can classroom instruction, and 3) the absence of face-to-face contact is not detrimental to the learning process."
1984 Winn, W. Why Media? Instructional Innovator.	"Media are primarily for the delivery and storage of information. Media do not directly determine the type or amount of learning. It is the messages themselves, which are carried by media, that are critical factors for producing achievement or changing attitudes."
1984 Zigerell, J. Distance Education: An Information Age Approach to Adult Education. ERIC Clearinghouse on Adult, Career, and Vocational Education. Columbus, Ohio.	"...performance does not significantly differ between telecourse and classroom students taking equivalent courses."
1983 Allen, M. L. Paper Presented to ASEE at the Arizona State Interactive Video Experience. Arizona State University.	"...overall [24 years], there was no statistically significant difference in the academic performance of the two groups..."
1983 Clark, R. E. Reconsidering Research on Learning from Media. University of Southern California.	"...there are no learning benefits to be gained from employing any specific medium to deliver instruction...The best current evidence is that media are mere vehicles that deliver instruction but do not influence student achievements any more than the truck that delivers our groceries causes changes in our nutrition."
1983 Holdampf, B. A. Innovative Associate Degree Nursing Program-Remote Area. Department of Occupational Education and Technology, Texas Education Agency.	"...audioconferencing with an existing nursing school...and videotapes of...classes were combined...there were also no significant differences in course grades or scores on national nursing tests..."
1983 Kurz, J. Student Evaluation of Instructional Teleconferencing. University of Wisconsin.	"...academic achievement and student satisfaction in teleconferencing classes is equal to that of students in resident classes."
1983 Smith, J. Evaluation of the Telecourse Program at Saddleback College: Student Retention and Academic Achievement. Nova University.	"In each instance no difference was found in the amount of learning that occurred between telecourse students and on-campus students."
1982 Christopher, G. R. The Air Force Institute of Technology--the Air Force Reaches Out Through Media: An Update. University of Wisconsin.	"...students learned at least as well as resident students..."
1982 Montgomerie, T. C. Telidon Distance Education Field Trial. Telidon Project Evaluation, Alberta, Canada, Department of Education, Planning and Research Branch, November. 207pp	"Telidon instruction was as effective as the traditional correspondence and conventional in-school instruction."
1981 Cohen, P., Ebeling, B., and Kulik, J. A Meta-Analysis of Outcome Studies of Visual-Based Instruction. Educational Communications and Technology Journal.	"...students learned slightly more from visual-based instruction than from traditional teaching, but there was typically no difference between the two groups in regard to course completion, student attitudes, or the correlation between attitudes and achievement."
1981 Sakamoto, T. Innovations in Higher Education. Research Institute for Higher Education, Hiroshima University.	"...conducted a series of televised lectures on identical subject matter in a similar situation...(1) with the professor's face on one TV monitor and two types of instructional material on the other two...(2) with any two TV images frozen...and any single moving image...(3) with no professor's face but two types of instructional material on two TV monitors...There were no significant differences in academic achievement among the three groups."



Date, Author, Study Title	Finding
1980 Wilkenson, G. L. Media in Instruction: 60 Years of Research. AECT and NAVA.	"The results of several decades of research...can be summed up as "no significant difference."
1979 Orlansky, S., and String, J. Cost-Effectiveness of Computer-Based Education in Military Training. IDA Paper, Science, and Technical Division, Institute for Defense Analysis, Arlington, VA.	"...overall difference in achievement had no practical significance because no significant difference in achievement was found in thirty-two studies."
1979 Sakamoto, T. Utilization of Educational Technology in Higher Education of Japan. The Pursuit of Excellence in Higher Education, Keinyong University, Korea.	"In terms of academic achievement there were no significant differences between the groups."
1978 Kelly, J. T., and Anadam, K. Nationwide Prime-Time Television in Higher Education. International Journal of Instructional Media.	"...remote mediated learning combined with appropriate contact with live instructors and peers, can be at least as effective and significantly less costly per unit than traditional lecture modes."
1978 Miller, G. R., and Fontes, N. E. Video Technology and the Legal Powers. Beverly Hills, CA, Sage.	"...no significant differences between information retention of jurors when television was used to present testimony instead of direct live observation."
1977 Crow, M. L. Teaching on Television. Faculty Development Resource Center, University of Texas.	"...participants may favor a 'live' teacher in their classroom, although research studies point out that both the televised image and live presentation are equally effective."
1977 Saloman, G., and Clark, R. E. Reexamining the Methodology of Research on Media and Technology in Education. Review of Educational Research.	"Studies have consistently reported achievement on performance tests was similar regardless of the medium used...media (face-to-face versus television) were not significant factors on achievement..."
1977 Schramm, W. Big Media Little Media. Sage.	"...media are mere vehicles that deliver instruction but do not influence student achievement..."
1977 Wood, D. M., and Wylie, D. G. Educational Telecommunications. Belmont, CA, Wadsworth.	"...there is no statistical basis to conclude that TV itself affects learning situations or grades positively or negatively..."
1977 Dambrot, F. General Psychology Over Closed-Circuit Television. Audio-Visual Communication Review, Vol. 20, No. 2.	A pilot study compared 18 control students enrolled in a regular closed-circuit television class of General Psychology with 18 experimental students who were assigned to an independent study section of General Psychology. Students in independent study viewed the TV lectures at the tape stations at their discretion and took course examinations when they felt prepared. The results indicated no significant difference in course achievement or attitude between the two methods of course preparation. Interaction effects between independent study vs. closed-circuit TV and three levels of scholastic ability were also nonsignificant.
1976 Gordon, G. N. Classroom Television: New Frontiers in ITV-Research and the Wonder Drug: NSD. Communication Arts Books, Hastings House.	"The kind of research that characterizes most of the documents purporting to examine ITV...show no significant difference between courses taught over television and equivalent courses given to live matched groups."
1976 Macken, E. Home-Based Education. U. S. Department of Health, Education, and Welfare. Washington, DC.	"...sixty-seven American studies of the effectiveness of correspondence education at the college, technical, and high school level...there was no significant difference in learning outcomes between correspondence and conventional study."
1975 Chu, G., and Schramm, W. Learning From Television: What the Research Says. ERIC ED 109 985.	"...an experimental study with 80 college students to test the effect of feedback on learning. No difference was found in learning and retention among four treatments...There can no longer be any real doubt that adults learn a great amount from instructional television...The effectiveness of television has now been



Date, Author, Study Title	Finding
	demonstrated...in many parts of the world, in developing as well as industrialized countries...and with a great variety of subject matter and methods...No difference was found in learning and retention..."
1974 Thorman, J. H., and Amb, T. The Video Tape Presentation versus the "Live" Presentation: Better, Worse or the Same? Moorhead State College.	"...the students learned the same amount, as measured by test performance, whether they were taught by the videotape-discussion method or by the lecture-discussion method..."
1973 Childs, G. B. Correspondence Study: Concepts and Comments. University of Nebraska.	"...it is clear that students who receive instruction by correspondence study achieve at least as well as students who study by other means including classroom instruction, programmed instruction, and television or by use of kinescopes or videotape...students in correspondence courses either matched or slightly exceeded the achievement of students taking the same courses via different formats. Instructional methodology seemed to make no significant difference."
1972 Anderson, C. M. In Search of a Visual Rhetoric for Instructional Television. Audio-Visual Communication Review, Vol. 10, No. 1.	"Administration decisions on the use of television seem to have assigned a positive evaluation to the same no significant differences, deducing that, if television can perform as well as conventional instruction, it holds great potential for solving some of the logistical and personnel problems in education."
1972 Schram, W. Quality in Instructional Television: What Research Says About ITV. University Press of Hawaii.	"Students like a 'talkback' system, but seem to learn no more with it than without it...No learning advantage has been demonstrated for 'professional' or 'artistic' production techniques..."
1971 Johnson, L. Cable Television and Higher Education: Two Contrasting Experiences. ERIC	"...students can learn about as well from television as from classroom instruction..."
1970 Forsythe, R. Instructional Radio. An Evaluation of Instructional Technology.	"Experimental studies comparing radio teaching with other means or media have found radio as effective as the so-called 'conventional methods. Even though radio has been criticized for being only an audio medium, studies have shown that visual elements in learning are not uniformly important."
1970 Gordon, G. N. Classroom Television: New Frontiers in ITV. New York: Hastings House.	"...participants may favor a 'live' teacher in their classroom, although research studies point out that both the televised image and live presentation are equally effective."
1969 Davis, R., Johnson, C., and Dietrich, J. Students Attitudes, Motivations Shown to Influence Reception to Televised Lectures. College and University Business, Vol. 46, No. 5, pp. 59-63.	"The overall distribution of grades for students who saw lectures live was not significantly different from students who saw lectures on TV."
1969 Dubin, R., and Hedley, R. A. The Medium May Be Related to the Message. University of Oregon, pp. 2 and 16.	"We started with some promising results that led us to the conclusion that face-to-face instruction is better than televised instruction. However, when we turned attention to variations in the television medium we discovered that the apparent reason for the face-to-face instructional superiority lay in the distinct inferiority of two-way television instruction. When we limited attention only to one-way television instruction it was not demonstrably inferior to face-to-face teaching. We found nothing in our analysis by teaching methods and subject matter taught that led us to a conclusion other than there was no measurable difference between the two media."
1969 Kittross, J. M. The Farther Vision-Educational Television Today: Chapter 14 Meaningful Research in ETV. University of Wisconsin.	"To our initial surprise and later disappointment we found over and over again that there were 'no significant differences' (NSD) between television and conventional instruction."
1969 Madson, M. L. Methods, Including CCTV, of Presenting Introductory Biology: Their "Affect" on College Freshmen. Minnesota University.	"There was no difference in achievement between groups."



Date, Author, Study Title	Finding
1969 Twyford, L. C. Educational Communications Media. Encyclopedia of Educational Research, p. 370.	"...in almost 90 percent of the comparisons there were no substantial differences in achievement or information gain [with media] over conventional instruction...Students learn about as well irrespective of the methods employed."
1968 Boswell, J. J., Mocker, D. W., and Hamlin, W. C. Telelecture: An Experiment in Remote Teaching. Adult Leadership.	"Pre- and post-test results showed no significant differences in mastery of content; student course evaluations showed no difference in student attitudes."
1968 Chu, G. C., and Schramm, W. Learning from Television: What the Research Says. National Association of Educational Broadcasters.	"...there is no statistical basis to conclude that TV itself affects learning situations of grades positively or negatively..."
1968 Mielke, K. Questioning the Questions of ETV Research. Educational Broadcasting Review.	"Media comparison studies, regardless of media employed, tend to result in no significant differences..."
1968 Thornton, J. W., and Brown, J. W. New Media and College Teaching: Instructional Television. NEA: Department of Audiovisual Instruction.	"There is no longer any question as to the efficacy of television in extending and improving instruction in higher education. In nearly every situation where it has been tried and carefully evaluated, results show that it permits learning equal to and not rarely superior to that achieved under traditional classroom practices."
1967 Chu, C., and Schramm, W. Learning from Television. Stanford University.	"Of the 421 separate comparisons made...308 showed no significant differences, 63 showed television instruction to be superior, and 50 found conventional instruction better. In a total of 202 comparisons of television and conventional teaching at the college level, 152 showed no significant difference in student performance, 22 showed television to be more effective, and 28 showed conventional teaching to be more effective."
1967 Reid, J. C., and MacLennan, D. W. Review of Trends in Research on Instructional Television and Film. University of Missouri.	"The vast majority of these studies has revealed no significant differences in measured performances between students who were instructed via television, and those who were taught directly."
1966 Hartley, J. New Education.	"...examined 112 studies that compared programmed instruction with conventional instruction and found that on measures of achievement 41 showed programmed instruction superior, 6 showed programmed instruction significantly worse, and 37 showed no significant difference between the two treatments."
1966 Murphy, J., and Gross, R. Learning by Television: The Question of Quality. Academy for Educational Development, Inc.	"...studies preponderantly document no significant differences in the measured results of the two modes of instruction."
1966 Skornia, H. J. What We Know From New Media Research. NAEB.	"Oregon reported students learning as well. The Hagerstown experiment reported that in no subject did TV fail to produce results at least as good as those achieved when classroom instruction alone was used."
1965 Gottschalk, G. H. Closed Circuit Television in Second Semester College German. Modern Language Journal.	"...students learning German from closed-circuit television did significantly better in aural and reading comprehension than students taught by the conventional method. However, the two groups had no differences on written finals."
1965 Razik, T. A. What Instructional Television Research Tells Us. State University of New York at Buffalo.	"...students taught by television learned content as well as or better than those taught without it...judged equal in the teaching of elementary music...found the TV group of medical school students superior, but not significantly so."
1964 Erdos, R. Unpublished report. New England University, Australia.	"...over a ten-year period correspondence study students and internal students of New England University in New South Wales both showed a pass rate of 74%."
1964 Greene, H. Improvement of Teaching by Television: Current Status of the Texas Educational Microwave Project. NAEB National Conference Proceedings.	"TEMP courses are as effective as face-to-face teaching. Even faculty members who may have objections to television for other reasons acknowledge this."



Date, Author, Study Title	Finding
1964 Sykes, R. A. The Effectiveness of Closed-Circuit Television Observation and of Direct Observation of Children's Art Classes for Implementing Teachers' Training in Art Education. Dissertation Abstracts 25, 2387.	"...no significant differences between the scores of face-to-face and TV observation groups...Scores of the two observation groups on the class were about the same."
1963 Carpenter, C. R. Research on Instructional Television. Pennsylvania State University	"The assessments and evaluations show at least that the use of television does not adversely affect the quality of instruction..."
1963 Castle, C. H. Open-Circuit Television in Postgraduate Medical Education. Journal of Medical Education 38, 254-260.	"...open-circuit television can be used in postgraduate medical education without undesirable effects."
1963 DeViney, R. D. An Evaluation of Closed-Circuit Television Observation for Students Taking Certain Courses in Elementary Education. Dissertation Abstracts 23, 3198-3199.	"No differences were found between mean difference scores on either of the content tests, on the scores of the problem-solving test, or on the mean difference scores on attitudes..."
1963 Grant, T. S., et al. Effectiveness of Television Within the Dental Laboratory. University of California, San Francisco Medical Center.	"No differences were found when achievement was compared between groups receiving instructions by television and illustrated lecture, despite a televised demonstration..."
1963 Greenhill, P. L., Lottes, J. J., and Pagano, A. Comparative Research on Methods and Media [Television] for Presenting Programmed Courses in Mathematics and English. Pennsylvania State University.	"...no significant differences between the two groups on any of the three measurements."
1963 Meacham, E. A. The Relative Effectiveness of Face-to-Face Lecture versus Instructional Television in a College Clothing Course. Dissertation Abstracts 24, 276.	"Multiple-regression techniques showed no significant differences between groups..."
1963 Reede, A. H., and Reede, R. K. Televising Instruction in Elementary Economics. Pennsylvania State University.	"...no significant differences in over-all achievement..."
1963 Skinner, T. B. An Experimental Study of the Effects of Prestige and Delivery Skill in Educational Television. University of Michigan, Ann Arbor.	"...no main effect for the prestige variable. A supplemental experiment indicated no significant differences between the two perceived prestige images..."
1963 Souder, M., et al. Study of the Effectiveness of Televised Instruction in a Physical Education Course. NAEB Journal 22, 1-2.	"...no significant difference between methods of instruction...No significant difference between methods of instruction was found for attitudes..."
1963 Spencer, R. E. Comparisons of Televised With Teaching and Televised With Instructor Presentations of English Grammar. Pennsylvania State University.	"...no significant differences between the high school TV and teaching machine groups or any of the criterion measures...no significant differences between the college TV and face-to-face groups on any of the achievement measures."
1963 Stickell, D. W. A Critical Review of the Methodology and Results of Research Comparing Televised and Face-to-Face Instruction. Pennsylvania State University.	"...10 [studies] were classified as 'interpretable.' Of these 10, all showed no significant differences in learning at the .05 level...no significant difference in learning...between televised teaching and conventional teaching."
1963 Walton, N. R. A Pilot Study of Student Attitudes in a Closed-Circuit Television Course by Use of Stimulated Recall. Dissertation Abstracts 24, 1082.	"There were no differences between the groups on scores...or on achievement in the course."
1962	"...there is no difference in achievement scores between the television and non-



Date, Author, Study Title	Finding
Alexander, F. D. An Experiment in Teaching Mathematics at the College Level by Closed-Circuit Television. Dissertation Abstracts 22, 2805.	television lectures..."
1962 Devault, M. V., Houston, W. R., and Boyd, C. C. Television and Consultant Services as Methods of Inservice Education for Elementary School-Teachers of Mathematics. University of Texas.	"...no significant differences between television and face-to-face lecture-discussion groups in changing teacher's attitudes toward the inservices program, or in changing teacher's understanding of mathematics and methods or in changing mathematics achievement and interest of pupils."
1962 Diamond, R. M. The Effect of Closed Circuit Resource Television Upon Achievement in the Laboratory Phase of a Functional Anatomy Course: A Comprehensive Investigation of Television as a Magnification Device During Laboratory Demonstrations. Dissertation Abstracts 23, 884.	"...no significant differences between groups taught conventionally and by television..."
1962 Martin, H. S. The Relative Effectiveness of Teaching Dramatic Understanding as Compared to Conventional Classroom Instruction. University of Nebraska.	"TV appears to be an equally effective means of instruction compared to face-to-face instruction..."
1962 Rogers, W. F. Television Utilization in the Observation Program for Teacher Education. San Jose State College.	"...no significant differences among scores of students in the five groups...no significant differences among groups on the four rating scales."
1962 Schramm, W. What We Know About Learning From Instructional Television: The Next Ten Years. Stanford: Institute for Communication Research.	"...the results of 393 studies were summarized. Of these, 83 showed differences in learning in favor of television, 255 reported no significant differences, and 55 favored direct classroom teaching... There can no longer be any doubt that students learn efficiently from instruction television. The fact has been demonstrated now in hundreds of schools, by thousands of students, in every part of the United States and in several other countries. Instruction television is at least as effective as ordinary classroom instruction, when the results are measured by the usual final examinations or by standardized tests...employing the usual tests that schools use...we can say with considerable confidence that in 65 percent of a very large number of comparisons between televised and classroom teaching, there is no significant difference. In 21 percent, students learned significantly more, in 14 percent, they learned significantly less, from television."
1962 Schueler, H., Gold, M. J., and Mitzel, H. E. The Use of Television for Improving Teacher Training and for Improving Measures of Student-teaching Performance. Phase I. Improvement of Student Teaching. Hunter College of the City of New York.	"...no significant differences among scores on a behavioral instrument used to record performance of the student teachers in the three treatments."
1961 Abel, F. P. Use of Closed-Circuit Television in Teacher Education: Relationship to Achievement and Subject Matter Understanding. University of Minnesota.	"No significant differences were found among the three groups..."
1961 Gropper, G. L., and Lumsdaine, A. A. An Investigation of the Role of Selected Variables in Programmed TV Instruction. American Institute for Research.	"...no significant differences between scores of any of the groups on the four experiments."
1961 Janes, R. W. An Educational Experiment With On-Campus	"There was no significant difference in attitudes toward sociology for either method of instruction."



Date, Author, Study Title	Finding
Open-Circuit Television. Journal of Educational Sociology 34, 300-308.	
1961 Myers, L. An Experimental Study of the Influence of the Experienced Teacher on Television. Syracuse University.	"...no significant differences in content scores of students in the television or face-to-face treatments."
1961 Popham, W. J. Tape Recorded Lectures in the College Classroom. AV Communications Review, 9.	"...the effectiveness of using audiotape-recorded lectures versus live lectures...no significant difference in student achievement..."
1961 Starlin, G., and Lallas, J. E. Inter-institutional Teaching by Television in the Oregon State System of Higher Education. Oregon State System of Higher Education. Report No. 2: 1959-61. Oregon State System of Higher Education.	"From the 6 years of study, the authors concluded that students on all campuses learned equally well when taught by television from one campus. Students also learned as well when taught by television as when taught by face-to-face methods."
1961 Wolgamuth, D. A Comparative Study of Three Techniques of Student Feedback in Television Teaching: The Effectiveness of an Electrical Signal Feedback System. American University.	"...no significant differences among groups or posttest subject matter scores when adjusted for pretest subject matter scores, and no significant differences when adjusted for both pretest and IQ scores. Analysis of variance indicated no significant differences among groups on retention scores. Analysis of variance on students' attitude of teacher effectiveness on televised teaching indicated no significant differences among groups..."
1960 Almstead, F. E., and Graf, R. W. Talkback: The Missing Ingredient. New York State Department of Education.	"...compared favorably with classroom students."
1960 Johnson, F. C. Feedback in Instructional Television. Journal of Communication 10, 140-146.	"...no significant difference in learning between the groups taught by an instructor with feedback and those taught by an instructor without feedback. Feedback, as provided in this study, does not appear to have a significant effect on communication."
1960 Kanner, J. H., and Rosenstein, A. J. Television in Army Training: Color vs. Black and White. Audio-Visual Communication Review 8, 243-252.	"...no significant differences between groups in the number of color or noncolor test items answered correctly."
1960 The Nebraska Experimental Program in the Use of Television and Correspondence Study. University of Nebraska.	"Achievement in algebra, literature, and general mathematics was about the same for the face-to-face and television groups."
1960 Reid, J. C. An Experimental Study of a Comparison of Content Learned, Attitude Toward Subject Matters, and Attitude Toward Instructional Television of Students in a Public Speaking Course Presented by Television and Face-to-Face Methods. University of Missouri.	"...no significant differences between the two sections in mean scores on either the mid-semester or the final subject-matter test, and there were no significant differences between the two sections on final grades...no significant differences between the two sections on attitudes toward public speaking scores for any of the testings."
1960 Seibert, W. F., and Honig, J. M. A Brief Study of Televised Laboratory Instruction. Audio-Visual Communication Review 8, 115-123.	"...no significant differences...only one difference in six comparisons - this in favor of the television group...An analysis of variance indicated no significant differences between the ITV and face-to-face groups for either the immediate or delayed post knowledge tests."
1960 Starlin, G., and Lallas, J. E. Inter-institutional Teaching by Television in the Oregon State Systems of Higher Education. Report No. 1: 1957-59. Oregon State System of Higher Education.	"School in American life...no significant differences on final examination scores...Human development...no significant differences for any of the three examinations between face-to-face and ITV students...Chemistry...no differences in the final examinations...Educational psychology- An analysis of variance on final examination scores between face-to-face and ITV students indicated no significant differences."
1959 Driscoll, J. P. Can TV Improve College Teaching? NAEB,	"...no significant difference between groups on the final examination...no significant difference between groups on the course content test gains...no significant



Date, Author, Study Title	Finding
Journal 18.	difference in the test performance..."
1959 Gordon, O. M., Nordquist, E. C., and Engar, K. M. Teaching the Use of the Slide Rule via Television. University of Utah.	"...no significant differences in final examination scores between ITV and face-to-face students..."
1959 Irwin, J. V., and Aronson, A. E. Television Teaching: Conventional Lecture versus Highly Visualized Film Presentations. University of Wisconsin, Madison.	"...there was no statistically significant difference between TV and face-to-face taught groups."
1959 Kanner, J. H., Katz, S., and Goldsmith, P. B. Evaluation of "Intensive" Television for Teaching Basic Electricity. Audio-Visual Communications Review 7, 307-308.	"...no consistent differences between the scores of the experimental and control groups. Aptitude level was more important than the instructional medium in determining test performance."
1959 King, C. E. A Comparative Study of the Effectiveness of Teaching a Course in Remedial Mathematics to College Students by Television and by the Conventional Method. Dissertation Abstracts 20, 2177.	"...no significant differences in achievement scores of students taking the course by ITV and those who had taken it face-to-face."
1959 Teaching by Television. Summary. Fund for the Advancement of Education and Ford Foundation.	"On the final examination there was no difference in achievement between the students in the television classes and those in the regular classes...the average total score for the semester also revealed no difference in achievement between the classes taught by the two methods. It is clear, however, that in many college courses students can be expected to do equally well in examinations whether they have been taught by a teacher in a regular classroom or by the same teacher over television. When the final scores were adjusted to compensate for the initial inequality, it was found that there was no difference among students..."
1959 Penn State Report	<p>"SUMMARY OF FINDINGS AT PENN STATE Comparative Effectiveness</p> <p>In 29 out of 32 controlled comparisons in seven different courses, there were no significant differences in achievement between students taught via closed-circuit television and those taught in the conventional manner.</p> <p>2. In three different courses, there were no significant differences between scores on course-related aptitude tests taken by students taught via TV and those taught by the same teachers in the conventional way.</p> <p>3. No significant differences in students' achievements were found when proctors of varying status were used to supervise classroom groups of students in televised classes.</p> <p>4. No significant differences in student achievement were found in comparisons of classes of various sizes taught via television.</p> <p>5. Several methods of providing for teacher-student interactions were studied in different courses. These included the use of questions and answers over an intercommunication system between the TV classrooms and originating room, and the rotation of students through the TV originating room. Neither of these methods produced measurable increments in learning, but the students strongly favored the use of the intercommunication system."</p>
1959 Westley, B. H., and Barrow, L. C. Exploring the News: A Comparative Study of the Teaching Effectiveness of Radio and Television. University of Wisconsin, Madison.	"...no significant differences between radio high-medium-, and low-ability groups and ITV high-medium, and low-ability groups on delayed recall scores."
1958 Carpenter, C. R., and Greenhill, L. P. An Investigation of Closed Circuit Television for Teaching University Courses. Instructional Television Research, Report Number Two. Pennsylvania State University.	"...studies of the comparative effectiveness of conventional and televised instruction, even though carefully designed to control variables...yielded non-significant differences in student's achievement scores."



Date, Author, Study Title	Finding
1958 Dreher, R. E., and Walcott, H. B. An Experimental Study of College Instruction Using Broadcast Television. San Francisco State College.	"...no significant differences in profiles...no significant differences among any of the three presentation groups...no significant differences among presentation methods..."
1958 Dyer-Bennett, J., Fuller, W. R., Seiberg, W. F., and Shanks, M. E. Teaching Calculus by Closed-Circuit Television. American Mathematical Monthly 63.	"...no significant differences between experimental groups and control groups..."
1958 Kanner, J. H., et al. Television in Army Training. Audio-Visual Communication Review 6, 255-291.	"No indication was found that intensive television sessions are more detrimental to classroom learning than face-to-face instruction."
1958 Los Angeles City School Districts. An Evaluation of Closed-circuit Television for Teaching Junior College Courses. Audio-Visual Communications Review 6, 237.	"...no significant differences in achievement scores of students in the studio, in TV classrooms, and in face-to-face classes."
1958 Meierhenry, W. C. A Study of Teaching by Television Under Two Conditions. University of Nebraska.	"...no significant differences in final test scores between the two groups."
1958 Purdue University. Closed-Circuit Television Instruction. Audio-Visual Communications Review 6, 77-78.	"There were no differences in learning."
1958 Siepmann, C. A. TV and Our School Crisis. Doff, Mead and Co.	"Students in massed groups, taught by television, appear to learn as much as students taught in classes, large or small, by conventional methods."
1958 Westover, F. L., et al. Report Evaluation the Results of Teaching Accounting I by Means of closed-circuit Television Presentation. University of Alabama.	"Analysis of variance conducted between experimental and control groups on final examination scores and on average course scores indicated no significant differences between groups...no significant differences between groups in the number of dropouts...ITV and face-to-face students tended to make about the same grades and to do as well (or as poorly)..."
1957 Becker, S. L., Dunlap, R., and Gerber, J. C. A Comparison of Three Methods of Teaching. Modern Literature. The State University of Iowa.	"...part of a class discussed in the studio with the instructor while the rest of the class watched. There were no differences in the final performances..."
1957 Benschoter, R. P., and Charles, Don C. Retention of Classroom and Television Learning. Journal of Applied Psychology 41, 253-256.	"Students taught by TV retained their material over 3 years as well as students taught by face-to-face methods of instruction."
1957 Davis, R., Johnson, C., and Dietrich, J. Closed-Circuit Television Experimentation on Campus. Michigan State University (unpublished).	"...no statistically significant difference between the two groups, over two successive quarters using different methods of analysis...How well do the students like courses taught via closed-circuit TV? An analysis of variance revealed no difference among the TV and non-TV groups."
1957 Lofthouse, Y. M. S. An Experiment With Closed-Circuit Television Instruction in Teacher Education. Dissertation Abstracts 17, 1513.	"...no significant differences in students' attitudes toward the course, whether taught on ITV or by face-to-face methods..."
1957 Macomber, F. G., et al. Experimental Study in Instructional Procedures. Oxford: Miami University.	"...no significant differences between scores of students in face-to-face or ITV classes when students were divided by ability levels."



Date, Author, Study Title	Finding
1957 Parsons, T. S. A Comparison of Instruction by Kinescope, Correspondence Study and Customary Classroom Procedures. <i>Journal of Educational Psychology</i> , 48: 27-40.	"...compared instruction by kinescope, correspondence study, and classroom procedures in a course in child development and found no advantage for any one procedure."
1956 Dowell, E. C. An Experiment in Training by Television. <i>Audio-Visual Communication Review</i> .	"It was concluded that the presentation methods were equally effective."
1956 Kumata, H. An Inventory of Instructional Television Research. University of Michigan.	"...the effects of television as a variable operating in a field of perhaps hundreds of other potential variables is of minor significance. Therefore, no significant differences in results are to be expected."
1956 Macomber, F. G., et al. Experimental Study in Instructional Procedures. Oxford: Miami University, Oct. 1, 1956.	"...no significant differences in achievement test scores between ITV and face-to-face students...no significant differences in achievement test scores between high-ability ITV students and high-ability face-to-face students...Similar results were obtained for low-ability students."
1956 Pollock, T. C., et al. Closed-circuit Television as a Medium of Instruction 1955-56. New York University.	"...no significant differences in the final grades of ITV and face-to-face students..."
1956 Stuit, D. B., et al. An Experiment in Teaching. Iowa Closed-circuit Television Teaching Experiment: Summary Report. State University of Iowa.	"Analysis of variance on television, lecture, and discussion groups achievement scores indicated no significant differences among groups on either of two achievement tests."
1955 Carpenter, C. R., and Greenhill, L. P. An Investigation of Closed-Circuit Television for Teaching University Courses. <i>Instructional Television Research</i> , Project Number One. Pennsylvania State University.	"The difference between the effectiveness of televised instruction versus conventional instruction was not statistically significant..."
1955 Frank, J. H. An Evaluation of Closed Circuit Television for Interceptor Pilot Training. <i>Dissertation Abstracts</i> 15, 2060-2061.	"...no significant differences in test scores..."
1954 Anderson, G. R., and VanderMeer, A. W. A Comparative Study of the Effectiveness of Lessons on the Slide Rule Presented via Television and in Person. <i>Mathematics Teacher</i> 47, 323-327.	"TV is an equally effective, compared to face-to-face, means of instruction..."
1954 Kanner, J. H., Runyon, R. P., and Desiderato, O. Television in Army Training: Evaluation of Television in Army Basic Training. George Washington University.	"In five of 17 tests given, the TV group scored significantly higher. In the remaining 12 tests no significant differences were found."
1954 Shimberg, B. Effectiveness of Television in Teaching Home Nursing. <i>Educational Testing Service, Research Bulletin</i> . RB-54-19.	"Television instruction was found to be as effective as classroom instruction in teaching facts...No significant differences were found between the TV-only and TV-plus-practice groups..."
1952 Stromberg, E. L. College for Television Home Study. <i>American Psychologist</i> 7, 507-509.	"The author concludes that open-circuit TV is an effective means of reaching college credit students in their homes."
1945 Woelfel, N., and Tyler, I. K. Radio and the School. Tarrytown-on-Hudson, N.Y.: World Book.	"The results of the study yielded no significant difference between the reading and listening groups. The most significant finding...the radio group did equally well as compared to the standard reading group...[also] reviewed several research studies that were designed to compare the effectiveness of instructional radio with traditional methods...no significant difference in achievement resulted from the



Date, Author, Study Title	Finding
	majority of studies reviewed."
1936 Sorenson, H. Comparative Abilities of Extension and Non-Extension Students. Twenty-third Annual Meeting, Association of Urban Universities, pp. 54-60.	"[Results of this study were very similar to Crump 1928 and showed]...no differences in test scores of college classroom and correspondence study students enrolled in the same subjects..."
1928 Crump, R. E. Correspondence and Class Extension Work in Oklahoma. Doctoral Dissertation, Teachers College, Columbia University.	"...no differences in test scores of college classroom and correspondence study students enrolled in the same subjects."



# ATTACHMENT B

## COURSE TRANSITION SEQUENCE







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Second Quarter FY 97



**CON 237** Simplified Acquisition Procedures  
**IRM 101** Basic Information Systems Acquisition  
**SAM 101** Basic Software Acquisition Management  
**SYS 211** IPPD  
**TST 101** Introduction to Acquisition Workforce Test and Evaluation

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Third Quarter FY 97

**ACQ 101** Fundamentals of Systems Acquisition Management  
**CON 101** Fundamentals of Contracting  
**CON 104** Fundamentals of Contract Pricing  
**CON 241** Information Technology Contracting  
**TST 202** Intermediate Test and Evaluation

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Fourth Quarter FY 97

**ACQ 201** Intermediate Systems Acquisition  
**CON 202** Intermediate Contracting  
**CON 243** Architect and Engineering Contracting  
**CON 244** Construction Contracting  
**CON 245** Task Order Contracting

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First Quarter FY 98

**CON 204** Intermediate Contract Pricing  
**CON 234** Contingency Contracting  
**CON 235** Advanced Contract Pricing  
**LOG 101** Acquisition Logistics Fundamentals  
**SYS 201** Intermediate Systems Planning, Research, Development, and Engineering

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Second Quarter FY 98

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**BCF 101** Fundamentals of Cost Analysis  
**BCF 102** Fundamentals of Earned Value Management  
**CON 242** Performance Support Contracting  
**LOG 201** Intermediate Acquisition Logistics  
**PQM 101** Production/Quality Management Fundamentals  
**PMT 302** Advanced Program Management

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Third Quarter FY 98

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**BCF 203** Intermediate Earned Value Management  
**CON 232** Overhead Management for Defense Contracts  
**GRT 201** Grants Management  
**PMT 203** International Security and Technology Transfer/Control  
**PQM 201** Intermediate Production/Quality Management

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Fourth Quarter FY 98

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**CON 210** Government Contract Law  
**CON 333** Management for Contracting Supervisors  
**LOG 221** Supportability Methods and Analyses  
**LOG 304** Executive Acquisition Logistics Management  
**SAM 201** Intermediate Software Acquisition Management

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First Quarter FY 99

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**SAM 301** Advanced Software Acquisition Management  
**BCF 103** Fundamentals of Business Management  
**CON 233** Cost Accounting Standards Workshop  
**CON 236** Contractual Aspects of Value Engineering  
**PQM 103** Defense Specification Management  
**PQM 104** Defense Specification Users Course

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Second Quarter FY 99

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**IRM 201 Intermediate Information Systems Acquisition**  
**LOG 203 Reliability and Maintainability**  
**LOG 204 Configuration Management**  
**PQM 301 Advanced Production and Quality Management**  
**SYS 301 Advanced Systems Planning, Research, Development, and Engineering**

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Third Quarter FY 99

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**BCF 204 Intermediate Cost Analysis**  
**BCF 206 Cost Risk Analysis**  
**CON 301 Executive Contracting**  
**IRM 303 Advanced Information Systems Acquisition**  
**LOG 205 Provisioning**  
**TST 301 Advanced Test and Evaluation**

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Fourth Quarter FY 99

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**BCF 207 Economic Analysis**  
**BCF 208 Software Cost Estimating**  
**BCF 205 Contractor Finance for Acquisition Managers**  
**BCF 209 Selected Acquisition Report**  
**BCF 210 Selected Acquisition Report Review**  
**BCF 211 Business Management Acquisition**

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First Quarter FY 00

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**BCF 301 Business, Cost Estimating, and Financial Management Workshop**  
**IND 101 Contract Property Administration Fundamentals**  
**IND 102 Contract Property Disposition**  
**IND 103 Contract Property Systems Analysis**  
**IND 201 Intermediate Contract Property Administration**  
**IND 202 Contract Property Management Seminar**

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Second Quarter FY 00

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**PMT 303 Executive Program Manager's Course**  
**PMT 304 Advanced International Management Workshop**  
**PMT 305 Program Manager's Survival Course (ACAT III Programs)**  
**PQM 203 Market Research and Commercial Items Descriptions**  
**PQM 211 Variability Reduction Techniques**  
**PQM 212 Market Research (Replaces PQM 202)**

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# ATTACHMENT C

## REFERENCES





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# ATTACHMENT D

## GLOSSARY





**Acquisition Community** Civilian and military personnel working at designated acquisition organizations.

**Affective Domain:** The area of human learning associated with attitudes, feelings, interests, opinions, world views, and values.

**Bloom's Taxonomy:** A classification of learning objectives developed by Benjamin Bloom that addresses affective and cognitive learning outcomes in hierarchical fashion. The taxonomy cites six cognitive behaviors: knowledge, comprehension, application, analysis, synthesis, and evaluation. The taxonomy also cites five affective behaviors: receiving, responding, valuing, organization, and characterization. (Psychomotor behaviors were not addressed by Bloom.)

**Cognitive Domain:** The area of human learning associated with intellectual skills, such as assimilation of information or knowledge.

**COTS Software:** Software that may be purchased as a commercial-off-the-shelf item.

**Course Validation:** A process designed to ensure that a training course is capable of achieving its intended aims and functions.

**DAWIA** Defense Acquisition Workforce Improvement Act.

**DAWIA Workforce** Civilian and military personnel subject to the provisions of 10 USC, Chapter 87.

**Distance Education:** *See Distance Learning*

**Distance Learning:** An instructional method in which the instructor or facilitator is geographically separated from the learners.

**Formative Evaluation:** The evaluation of instructional content and methods conducted during early developmental stages for the purpose of revising and improving materials before widespread use.

**Internet:** An international computer network made up of scores of smaller networks that are linked together by international protocols.

**Kirkpatrick Model of Evaluation** A classic four-level model of summative evaluation developed by Donald Kirkpatrick. The evaluation levels are: (1) reaction, (2) learning, (3) behavior, and (4) results. For example, a Level 3 evaluation would assess training transfer, and a Level 4 evaluation would examine whether organizational goals for the training have been met.

**One-Way Video Teletraining:** A distance learning method using audio conferencing between two or more sites combined with video signals from the sending facility.



**Psychomotor Domain:**The area of learning associated with physical movement and skills.

**Push Systems Technologies** An Internet application that allows information to be sent to users/learners based on their interests/profile information.

**Rapid Prototyping:**In technology-based training design, the early development of a small-scale prototype used to test key features of the design.

**Summative Evaluation:**The evaluation of instruction that is conducted during and after delivery in order to assess the instructional environment, learning, on-the-job use, and return on investment. Summative evaluation occurs during the evaluation phase of ISD.

**Training Transfer:** The application of new knowledge and skills, acquired during training, in the work setting (on-the-job application).

**Two-Way Video Teletraining:**A distance learning method using audio and video images exchanged between two or more locations.

**Web:** See World Wide Web.

**World Wide Web (www):**A graphical hypertext-based Internet tool that provides access to homepages created by individuals, businesses, and other organizations.



## ATTACHMENT E

### Errata

▼ ERRATA #1



## ATTACHMENT B: COURSE EVALUATION SEQUENCE

Third Quarter FY 97

**ACQ 101**      **Fundamentals of Systems Acquisition Management**  
~~**CON 101**      **Fundamentals of Contracting**~~      —      Move to 3rd Qtr FY 98  
**CON 104**      **Fundamentals of Contract Pricing**  
**CON 241**      **Information Technology Contracting**      —      Hold until SAM 101 and IRM 101 completed  
**TST 202**      **Intermediate Test and Evaluation**      for possible reuse modules and DCCMB approval.

Fourth Quarter FY 97

**ACQ 201**      **Intermediate Systems Acquisition**  
~~**CON 202**      **Intermediate Contracting**~~  
~~**CON 243**      **Architect and Engineering Contracting**~~  
~~**CON 244**      **Construction Contracting Management**~~  
**BCF 102**      **Fundamentals of Earned Value Management (BCEFM FB)**  
**BCF 211**      **Business Management Acquisition (possible)**  
~~**CON 245**      **Task Order Contracting**~~      —      Course development not approved.  
**LOG 203**      **Reliability and Maintainability (AFIT)**

First Quarter FY 98

**CON 204**      **Intermediate Contract Pricing**  
~~**CON 234**      **Contingency Contracting**~~      —      Move to 2<sup>nd</sup> Qtr FY 99  
~~**CON 235**      **Advanced Contract Pricing**~~  
**CON 236**      **Contractual Aspects of Value Engineering (AFIT)**  
**LOG 101**      **Acquisition Logistics Fundamentals**  
**SYS 201**      **Intermediate Systems Planning, Research, Development, and Engineering**

Second Quarter FY 98

~~**BCF 101**      **Fundamentals of Cost Analysis**~~      —      Move to 2<sup>nd</sup> Qtr FY 99  
~~**BCF 102**      **Fundamentals of Earned Value Management**~~      —      Move to 4th Qtr FY 97  
~~**CON 242**      **Performance Support Contracting**~~      —      Course development not approved.  
**CON 243**      **Architect-Engineer Contracting**  
**CON 244**      **Construction Contracting**  
**LOG 201**      **Intermediate Acquisition Logistics**  
**PQM 101**      **Production/Quality Management Fundamentals**  
**PMT 302**      **Advanced Program Management**      Integrated Scheduling (Acq Mgmt, new)

## ATTACHMENT B: COURSE EVALUATION SEQUENCE

### Third Quarter FY 98

**BCF 203** Intermediate Earned Value Management  
**BCF 207** Economic Analysis  
**CON 101** Fundamentals of Contracting (AFIT)  
**CON 232** Overhead Management for Defense Contracts  
**CON 235** Advanced Contract Pricing (AFIT)  
**~~GRT 201~~** ~~Grants Management~~  
**PMT 203** International Security and Technology Transfer/Control  
**~~PQM 201~~** ~~Intermediate Production/Quality Management~~ — Move to 4th Qtr FY 98

### Fourth Quarter FY 98

**CON 210** Government Contract Law — Break up to basic law (Web) and seminar (AFIT)  
**CON 333** Management for Contracting Supervisors  
**GRT 201** Grants Management  
**LOG 221** Supportability Methods and Analyses  
**LOG 304** Executive Acquisition Logistics Management  
**PQM 201** Intermediate Production and Quality Management (AFIT)  
**SAM 201** Intermediate Software Acquisition Management

### First Quarter FY 99

**BCF 103** Fundamentals of Business Management  
**BCF 206** Cost Risk Analysis  
**CON 233** Cost Accounting Standards Workshop  
**~~CON 236~~** ~~Contractual Aspects of Value Engineering~~ — Move to 1st Qtr FY 98  
**PQM 103** Defense Specification Management } Move to 3rd Qtr FY 98 -  
**PQM 104** Defense Specification Users Course } possible  
**SAM 301** Advanced Software Acquisition Management

### Second Quarter FY 99

**BCF 101** Fundamentals of Cost Analysis  
**CON 234** Contingency Contracting  
**IRM 201** Intermediate Information Systems Acquisition  
**~~LOG 203~~** ~~Reliability and Maintainability~~ — Move to 4<sup>th</sup> Qtr FY 97  
**LOG 204** Configuration Management  
**PQM 301** Advanced Production and Quality Management  
**SYS 301** Advanced Systems Planning, Research, Development, and Engineering

## ATTACHMENT B: COURSE EVALUATION SEQUENCE

Third Quarter FY 99

BCF 204 Intermediate Cost Analysis  
~~BCF 206 Cost Risk Analysis~~  
CON 202 Intermediate Contracting  
CON 233 Cost Accounting Standards Workshop  
 CON 301 Executive Contracting  
 IRM 303 Advanced Information Systems Acquisition  
 LOG 205 Provisioning — ? Technology - small throughput - (AFIT)  
 TST 301 Advanced Test and Evaluation

Fourth Quarter FY 99

~~BCF 207 Economic Analysis~~  
 BCF 208 Software Cost Estimating  
 BCF 205 Contractor Finance for Acquisition Managers  
 BCF 209 Selected Acquisition Report  
 BCF 210 Selected Acquisition Report Review  
 BCF 211 Business Management Acquisition

First Quarter FY 00

BCF 301 Business, Cost Estimating, and Financial Management Workshop — Move earlier in  
CON 333 Management for Contracting Supervisors schedule (BCEFM FB)  
 IND 101 Contract Property Administration Fundamentals }  
 IND 102 Contract Property Disposition } Should these be converted - small  
 IND 103 Contract Property Systems Analysis } throughput - (AFIT)  
 IND 201 Intermediate Contract Property Administration }  
 IND 202 Contract Property Management Seminar }

Second Quarter FY 00

PMT 303 Executive Program Manager's Course  
 PMT 304 Advanced International Management Workshop  
 PMT 305 Program Manager's Survival Course (ACAT III Programs)  
 PQM 203 Market Research and Commercial Items Descriptions  $\frac{3}{4}$  Contractor-delivered  
 PQM 211 Variability Reduction Techniques  
 PQM 212 Market Research (Replaces PQM 202)  $\frac{3}{4}$  Contractor-delivered