CHAPTER THREE

INSTRUCTIONAL DESIGN OF DISTANCE TRAINING

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This chapter describes a systems processing model for developing and implementing distance and distributed education and training. The model employs a reiterative process of analysis and design and is derived from the theories of instructional systems development and conceptual frameworks of learning. The *guiding principles* presented in the Preface represent an outline of this instructional design model for distance training.

The goal of the proposed model is to maximize utilization of technology and institutionalize an organization's distance learning efforts. Instructional needs and performance outcomes of a distance training event or program are defined by business goals and objectives. The impact of organizational culture, as well as internal corporate dynamics, are also discussed within the model.

The author distinguishes here between a distance training event and a distance training program. A distance training program is not a program of instruction, such as a curriculum of courses or modules. A distance training program refers to an organizational process, consisting of policies and procedures specific to departments' or divisions' functions and responsibilities. In contrast, a distance training event does represent an independent course or module. The distance training event is often an isolated and separate delivery exercise.

Introduction

A century of dramatic change and innovation in organizational and instructional hardware and software has resulted in telecommunications and satellite technologies that are poised to support significant improvement in the interactivity, collaboration, and real-time delivery of distance education and training. Yet even with such promise, not all organizations are successful. While some companies and agencies boast an anticipated 1200 percent increase in distance training over the next five years (Picard, 1996), others lament their distance learning experience with a been there, done that attitude (Green, 1997).

Green (1997) acknowledges that technology-laden distance learning is neither simple nor inexpensive. Whereas onsite classroom learning requires trained instructors, strong lesson plans, and ongoing feedback to students, distance and distributed education and training requires all this plus expert design and development for using instructional technology, critical-path planning, and an accurate timeline to ensure proper, coordinated, and effective implementation (Piskurich, 1997). Unsuccessful distance training events mercilessly reflect lack of preparation or unfocused or mis-directed instructional objectives.

To realize the full potential of distance learning, designers and developers must apply an analytical approach to the design, selection, and utilization of distance learning media and methodology (Pisel, 1995; Schreiber, 1996). The availability and utilization of information and communication technologies alone are not enough for distance learning and distance training to succeed (Visser, 1997). It is a clear understanding of the instructional needs of the training program that drives effective selection of instructional media, appropriately chosen instructional methodologies, and ultimately successful implementation of distance learning.

An organization that finds its initial distance learning efforts result in less than desired outcomes can determine areas for improvement by considering the following phenomena. Sometimes an instructional analysis has not occurred. Content information may have been presented in a disorganized fashion rather than selected, structured, and sequenced appropriately (Visser, 1997). If an instructional analysis has occurred, instructional methodologies may have been designed that are inconsistent with the capabilities of the selected delivery tool (Green, 1997). Further, trainers may have been reluctant (or unable) to use the new technologies (Picard, 1996).

Often times content applications have not been defined by an organization's business goals and objectives. This results in a distance learning event that may be effectively implemented (from a procedural perspective) but contributes mini-

mally to an organization's strategic gains. Finally, organizational technology and instructional personnel may have been treated as marginal costs rather than core costs (Green, 1997). This results in front-end costs that may significantly exceed expectation (Picard, 1996) and produce less-than-desired overall return on investment. Whatever the specific causes, initial distance learning results can be dismal when critical components of the process are overlooked or misunderstood.

Application of Instructional Systems Development to Distance Training

Distance and distributed education and training represent a process composed of multiple and diverse elements. These elements or components are associated with several categories, including the learner, instructor, learning environment, instructional delivery technology, and the culture of the organization providing the training. To understand the instructional needs of a distance training event or program, it is necessary to understand the primary components of the distance learning process itself. Further, as an organization strives to design and implement distance training that contributes strategically to the institution or agency, it is necessary to define instructional needs relative to performance outcomes and achievement of business goals and objectives.

Instructional Systems Development (ISD)

Over the years, researchers have advocated the use of a systems processing approach to analyze and design instruction. Dick and Carey (1994), Gagne, Briggs and Wager (1992) and Patrick (1992) represent just a few. The Instructional Systems Development (ISD) approach provides a strategy for accounting for all the components of an instructional process, as well as explaining the role each component plays within a given instructional event or program (Dick and Carey, 1996).

Applying the systems processing approach of ISD to the development and delivery of distance and distributed education and training provides a strategy for understanding the roles of the student located at a remote site and the instructor designing materials to be delivered at a distance over some technical medium. A systems processing strategy enables investigation of the relationships among various elements of the process, including, in addition to the student and instructor, the learning environment (for example, site planning for a satellite broadcast, or desktop access), the instructional technology (compressed video or Internet), and culture of the institution or agency (including level of organizational technology capability for providing distance training). Employing a systems approach,

identifying all the components, and determining the exact contribution of each to the outcome ensures a stronger, more effective distance training effort (Moore and Kearsley, 1996).

The application of ISD to distance and distributed learning strengthens the design and development of distance training because it enables the instructional designers and content specialists to (a) focus on what the learner at a distance is to learn, (b) become aware of and remain alert to the interactivity between students and instructor, as well as the hardware and software used for delivery, and (c) replicate effective distance training instructional events to meet business goals and objectives of the organization (Dick and Carey, 1996; Moore and Kearsley, 1996). The use of an ISD approach discourages the designer from trying to create instruction for a telecommunication or satellite technology delivery medium prior to completing an analysis of what it is to be taught and how. The designer who employs a systems approach sets up a checks-and-balances system that ensures that the instruction created is strengthened by the technology chosen to deliver it at a distance.

Instructional Systems Development represents a systems processing approach to the analysis, design, development, implementation and evaluation (ADDIE) of education and training. The ADDIE process is a reiterative phenomenon that when applied to distance and distributed education and training facilitates procedural review of design and delivery of instruction at a distance.

ADDIE and Distance Training

The application of ISD to distance training facilitates a customization of the ADDIE process. The activities and tasks associated with analysis, design, development, implementation, and evaluation of instruction are tailored to address the specific characteristics of distance and distributed learning. For example, as the ISD process is applied to business-driven distance and distributed learning, planning of distance training events includes not only instructional analysis but also organizational analysis and determination of business goals and objectives. Performance outcomes become identified by operational business needs, as well as instructional or procedural requirements.

The design and development phases of the ISD process applied to distance learning include preparation of appropriate instructional events and instructional methodologies consistent with the selected delivery tools. Instructional designers and content experts apply conceptual frameworks of learning at this stage to determine how content information and knowledge will be transmitted and transformed by the learner. Strengths and weaknesses of technology delivery tools are reviewed; availability and access to technology is determined; and

accommodation is made to the organizational (or departmental function) technology plan.

As the processes of design and development progress, a *transitioning* occurs that moves the designer from instructional analysis and design of instructional events to development of instructional methodology and distance learning delivery strategies. Flowcharts are used to illustrate distance education and training teaching and learning activities. Instructional materials are then developed and incorporated to facilitate effective implementation of the distance training event or program.

The implementation process for delivering distance and distributed learning successfully relies on the contributions of an interdisciplinary team and organizational support for continuation and maintenance of the effort. The distance training team (or Core Steering Committee) can facilitate mutual respect and ownership among multiple experts within the organization for successful implementation. Delivery of the distance training event or program becomes stable and predictable but not inflexible. Organizational policies and procedures begin to develop, and recognition of distance learning by the institution or agency (as a whole) occurs. Strategic contributions result from the distance training events, and implementation efforts become institutionalized.

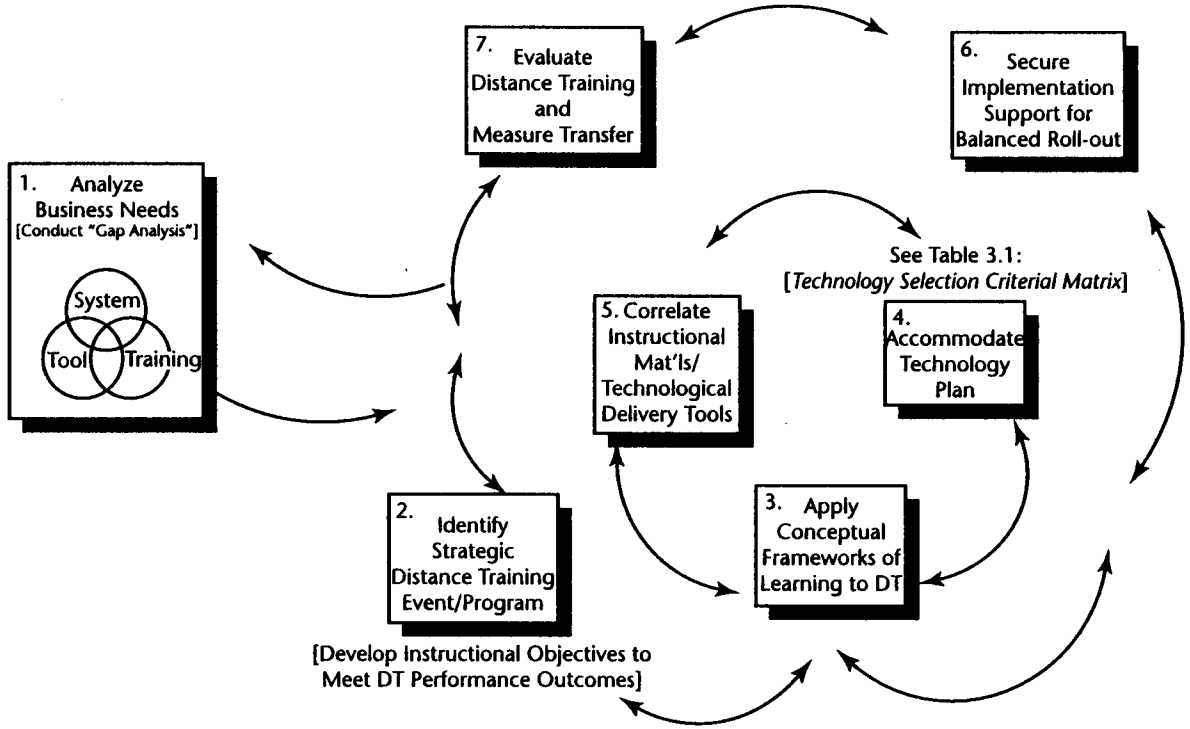
The evaluation process of distance and distributed learning includes both formative and summative assessments. Formative evaluations occur repeatedly and focus primarily on the learner, instructor, learning environment, delivery technology, and organizational culture. The inter-relatedness of these elements is constantly studied and the cause-and-effect accounted for. Summative evaluation determines the overall strengths and weaknesses of the distance training effort.

Employing a systems approach to design and deliver distance training ensures a stronger, more effective effort. For this reason an instructional design model has been created to guide planning and preparation of distance training that tailors the primary processes of analysis, design, development, implementation, and evaluation to providing successful business-driven distance and distributed learning.

Instructional Design Model for Distance Training (IDM-DT)

Figure 3.1 illustrates a model of instructional design for development and implementation of distance training. This model manifests a systems processing approach to distance and distributed learning. The purpose of this model is to identify the organization's business goals and objectives, identify performance outcomes that contribute to these goals, identify distance and distributed instructional events and instructional methodologies which facilitate performance change, select the most appropriate technological tool to deliver the distance training, and

FIGURE 3.1. INSTRUCTIONAL DESIGN MODEL FOR DISTANCE TRAINING [IDM-DT].



The goal of the proposed instructional design model for distance training is to maximize utilization of technology and institutionalize an organization's distance learning efforts. Instructional needs and performance outcomes of a distance learning event or program are defined by business goals and objectives. The impact of organizational culture, as well as internal corporate dynamics, are also considered within the model.

engage organizational support for ongoing maintenance and service. The ultimate outcomes of the instructional design model are maximum utilization of technology and institutionalization of an organization's distance training efforts.

The Instructional Design Model for Distance Training (IDM-DT) correlates instructional strategy, delivery technology, and desired performance outcomes. The model is driven by an initial "gap analysis" (to determine business needs), followed by identification of associated performance objectives that make strategic contributions to the organization. The IDM-DT provides a methodology for meeting the demands of distance training instructional event(s) through applying conceptual frameworks of learning, using selection criteria to identify effective technology delivery tools, and designing instructional materials consistent with the strengths of the delivery tools. The impact of organizational culture and internal corporate dynamics is also addressed.

Following is a discussion of the Instructional Design Model for Distance Training. It represents an eight-step reiterative process that provides a model for development and implementation of distance and distributed education and training. The eight steps or categories of tasks include (a) analyze business needs, (b) identify *strategic* distance training events and programs, (c) apply conceptual frameworks of learning to distance training, (d) develop and accommodate (organizational) *technology plan,* (e) correlate distance learning instructional materials to technology delivery tools, (f) secure implementation support, (g) implement a balanced rollout strategy, and (h) evaluate distance learning processes and measure transfer.

The potential of the IDM-DT to positively impact delivery of distance learning within an institution or agency is enhanced significantly with participation of an organizational team. This team, sometimes referred to as a Distance Learning Core Steering Committee, is comprised of education and performance experts, information systems engineers, communications professionals, and executive managers. Team dynamics and the internal corporate interface will be discussed further as part of the concepts associated with developing an organizational technology plan and securing implementation support for distance learning at an organizational level.

Analyze Business Needs

The first step of the instructional design model for effective design and development of distance training (see Figure 3.1) is an analysis of business goals and objectives of the organization. Successful distance training often is defined by the strategic contribution it makes to an organization. Such contributions are measured against specific business needs.

Accurate identification of a company or agency's business needs and determination of whether distance training can provide a solution requires several questions to be answered. First, is the initial crisis or organizational *alert!* for distance learning related to a systems problem, a problem with some organizational tool, or a specific training or performance need? Second, if the recognized problem is identified as a need for performance change, will the change occur through education and training for increased knowledge and skill, improved execution of a task, or attitudinal change? Finally, if education and training for enhanced performance is the answer to the organizational problem, it must be determined whether such activities can occur effectively at a distance.

In an attempt to identify business needs of an organization and the potential for distance training to address these needs, the following tasks are helpful: (a) conduct an organizational needs analysis, (b) determine if a gap exists between what is operationally and what should be (or what is desired) within the agency or institution, and upon completion of a gap analysis (c) confirm primary business goals and objectives of the organization relative to desired performance change.

The first analysis, an organizational needs analysis, integrates collection and evaluation of data to identify and confirm specific organizational traits and characteristics. A number of techniques and instruments are employed to collect organizational data. Live interviews may be conducted, or self-administered self-paced surveys may be distributed. Multiple levels of staff and managers are engaged in the data collection process. An intended outcome of organizational needs analysis is the identification and confirmation of documented processes and procedures within the agency or institution, as well as any unseen patterns of structure that influence individual and organizational behavior (Senge, 1994). This structure may be unofficial (undocumented) processes and procedures which represent "the *real way* things get done in the company."

The next process of analysis includes a gap-analysis. A *gap-analysis* employs live interviews and self-administered survey instruments to determine whether inconsistencies exist between what is operationally and what should be within the organization. An *operational* measure may include production levels, product reliability, fixed and variable costs, gross margins of ROI, and response to customer service. An ultimate objective of gap-analysis is to identify what performances actually occur throughout the organization and compare this to the performances necessary to meet specific business needs.

Robinson and Robinson (1996) describe the use of Performance Relation Maps to compare current staff behaviors and the related operational results to desired (although not yet attained) business goals and objectives. The business needs of an organization are defined by the gap between what currently is and what should be, as stated in the business goals and objectives. An organization's vision

and mission statements may be used to identify a corporation's or agency's business goals and objectives.

The final stage of analysis in Step One of the IDM-DT is defined by confirmation of an organization's primary business goals and objectives. Once confirmed, this analysis focuses on the significance of business goals and objectives in identifying appropriate performance change to facilitate organizational improvement and growth. Effective resources for data to confirm an organization's business goals and objectives and to confirm the potential for performance change to facilitate improvement include (a) key individuals who work with clients and are directly responsible for attaining business goals (Robinson and Robinson, 1996) and (b) a variety of internal and external documents provided by the client organization or industry (for example an organization's Strategic Plan, customer demographics reports, an organization's operating statements, the information system's threeyear technology plan, an organization's past and current task force activities, and government and industry standards and economics projections) (Robinson and Robinson, 1996; Senge, 1994).

Identify Strategic Distance Training Events and Programs

Strategic contributions to an organization are those which engage a company to work smarter, innovate faster, and ultimately perform stronger than the competition. To ensure that distance training contributes strategically, distance learning performance outcomes must meet the business needs of the organization. At this stage in the systems processing model for designing and developing distance training, it is necessary to determine whether training is, in fact, an effective solution to improving performance and meeting the business needs of the organization, and whether such training can be delivered successfully at a distance to realize performance outcomes.

Step Two of the instructional design model for developing distance training includes two primary tasks: (a) identifying business-driven performance outcomes that may contribute strategically to an organization and (b) conducting a cost-benefit analysis to determine the potential return-on-investment (ROI) of distance training to attain the identified performance outcomes.

A performance outcome is a detailed description of what the learner will be able to do upon completion of a learning event (Dick and Carey, 1996). A learning (or instructional) event is the arrangement of external activities to engage and support the internal processes of learning (Gagne, 1975). An instructional event is manifested by a description of pre-instructional activities, one or more instructional methodologies employed to present information, what the students do with the content information received, and how performance is

tested. (Note: Design and development of instructional events occurs in Step Three of the IDM-DT process.)

A cost-benefit analysis is recommended to determine the potential ROI of the distance training instructional event in attaining the identified performance outcomes. Costs include core costs, as well as marginal costs. Core costs are the costs associated with doing business and are identified and budgeted accordingly. Marginal costs represent non-documented overhead and are embedded informally in other budgets. Benefits may be avoidance of lost productivity, as well as strategic gains from just-in-time information. (See Step Four of the IDM-DT for further discussion of costs and organizational technology plans.)

Following are some recommended strategies for (a) identification and development of business-driven performance outcomes and (b) implementation of a related cost-benefit analysis. It is strongly suggested at this stage to engage a small group of organizational managers, training professionals, content experts, and end-users or members of the target audience to complete the following tasks. (The following discussion results from review of related research by Alessi and Trollop, 1991; Dick and Carey, 1996; Robinson and Robinson, 1996; Schreiber, 1996; and Senge, 1994).

Identification and Development of Business-Driven Performance Outcomes

1. Write down (on individual sheets of paper or one large poster-board) the business need(s) identified from previous organizational and gap analyses; define each business need in operational or measurable terms (such as productivity levels, product reliability, and gross ROI);
2. Discuss driving forces behind business needs;
3. List past and current training and non-training strategies used in an attempt to meet these needs;
4. Identify implications for performance improvement as envisioned by clients, instructional designers, content specialists, and performance consultants;
5. Brainstorm to identify the behaviors of staff and managers that would contribute to improving performance and fulfilling the identified business need(s); content specialists, subject matter experts and designers may need to conduct task analyses and analysis of processes and procedures within the organization to identify these behaviors; examine external forces (outside the immediate function or organization) that may influence behavioral change or performance improvement; do not eliminate any suggested behaviors at this stage;
6. Sort through the stated behaviors and select those that most efficiently and effectively contribute to fulfilling the stated business need(s);

7. Select indicators of these identified behaviors; *indicators* are demonstrated skills and knowledge or exhibited behaviors indicative of specific attitudes;
8. Incorporate each indicator into a statement of what the learner will do upon completion of the distance training event or program; and finally,
9. Evaluate the resulting statement(s) for clarity and their relationship to the initial business goal or objective and/or business need.

Conducting a Cost-Benefit Analysis for Distance Training. A cost-benefit analysis is recommended to determine the potential ROI of distance training in attaining the identified performance outcomes. Costs and benefits of both hard dollar savings and strategic benefits should be included in the analysis. The following tips have been developed (from field experiences) to aid in the justification of identified costs:

- Document the financial and business objectives of the project
- Develop, as appropriate, instructional and delivery strategies that address the objectives
- Analyze distance delivery systems (stand-alone, intranet/web-based, asynchronous, live interactive distance training, one-way video two-way audio distance training)
- Analyze current operational expenses
- Relate the financial results of the analysis to the business objectives
- Account for total travel costs
- Examine productivity savings
- Estimate strategic gains
- Do not over-analyze

Apply Conceptual Frameworks of Learning to Distance Training

To develop and execute instructional events that successfully facilitate attainment of distance learning performance objectives, a designer must plan an effective instructional strategy that reinforces an identified model of learning. An instructional strategy primarily describes how content information will be presented and what the learner will do with it. A teacher-led instructional methodology may be used, or an individual, self-paced methodology may be determined to be the stronger instructional strategy.

Essentially there are two frameworks from which to view education and training at a distance. Berge explains that in the first framework (see Chapter Two), content and knowledge determined by someone else is transmitted to the learner. In the second framework, a learner transforms information, generates

hypotheses, and makes decisions about the knowledge he or she is constructing or socially constructing through interpersonal communication with others (Berge). Successful distance training occurs when instructional events are consistent with the characteristics of the selected learning model.

Step Three of the Instructional Design Model for Distance Training focuses on the design and development of instructional events that are effective in facilitating learning at a distance. To ensure that an instructional event is consistent with the characteristics of the selected learning model, however, an instructional analysis is recommended. An instructional analysis facilitates effective design and development of instructional events to facilitate mastery of identified performance outcomes. The following paragraphs describe the process of instructional analysis, followed by a description of the characteristics of effective instructional events for distance training.

Implementation of Instructional Analysis for Design of Strategic Distance Training Instructional Events. The goal of instructional analysis is to develop primary instructional objectives which facilitate mastery of the business-driven performance outcomes. Instructional objectives are statements of what the learner will do with some level of proficiency. Dick and Carey (1996) recognize three primary strategies for instructional analysis: hierarchical analysis, procedural analysis, and cluster analysis. Hierarchical analysis identifies primary intellectual goals and describes subordinate knowledge and skills accordingly. Procedural analysis identifies psychomotor goals and describes sequential, subordinate tasks. Cluster analysis identifies verbal information goals and categorizes the subordinate terms and vocabulary.

An instructional analysis of business-driven performance outcomes is similar to the type of instructional analysis conducted by educators to determine educational outcomes. This process examines the following traits of associated content information: (a) sequencing of concepts, (b) size of instructional module(s) or activities, (c) style or mode of presentation, and (d) types of examples used to illustrate ideas (Gagne, 1975; Patrick, 1992; Dick and Carey, 1996). The sequencing of concepts is determined by the type of reasoning intended; a learner who progresses in thinking from general to specific ideas experiences deductive reasoning. This is in contrast to inductive reasoning whereby the learner begins to construct generalizations from individual, specific examples. The size of the content modules depends on audience prerequisite skill levels, motivation, and experience with delivery technologies. The style or mode of presentation of content information may range from expository to discovery, including tutoring, drill and practice, games, role-play, problem-solving, or discovery labs (respectively). And examples and non-examples may be identified to reinforce learning.

Following is a set of activities that are helpful in implementing instructional analysis of business-driven distance training performance outcomes (this discussion results from review of related research by Alessi and Trollip, 1991; Berge, 1994; and Dick and Carey, 1996):

1. List on paper the business-driven performance outcome(s) identified previously;
2. Identify a primary instructional goal that facilitates mastery of the identified business-driven performance outcome; determine whether the instructional goal represents development of an intellectual or psychomotor skill, completion of procedural task, or categorization of verbal information;
3. Describe target audience; identify dominant learning style, prerequisite skill levels, motivation and experience with delivery technologies; describe size of audience, remote site locations, and access to hardware and software for distance delivery of instruction;
4. Apply appropriate instructional analysis techniques: hierarchical, procedural, or cluster analysis (or some combination); flowchart or map subordinate and coordinate relationships among knowledge, skills, and tasks associated with the primary instructional goal;
5. Discuss the following questions embedded in each type of instructional analysis:
   - Hierarchical analysis: what must the participant already know or be able to do in order to learn subordinate knowledge and develop subordinate skills to ultimately attain the intellectual skill and perform the intended outcome?
   - Procedural analysis: what would the learner have to do in this step in order to progress closer to completing the final intended task?
   - Cluster analysis: what verbal (or written) information is needed by the participant to learn the categories of knowledge necessary for performance of the intended outcome? What rules or discriminations are appropriate for categorizations?
6. Examine strengths and weaknesses of various instructional methodologies (such as lectures, role-play and discovery labs); discuss how to teach to facilitate learning and attainment of instructional goal(s); and finally,
7. Brainstorm to identify learning activities that facilitate student-student collaboration, student-student and student-instructor interaction, flexibility in communication (synchronous and asynchronous), and locus of control over content and pace of instruction.

An instructional analysis identifies the instructional methodologies most conducive to participant prerequisite skills, motivational level, and experience with technology. An instructional analysis is a procedure that, when driven by business

goals and objectives, identifies and confirms the knowledge, skills, and attitudes required to master strategic distance learning performance objectives.

Characteristics of Instructional Events for Distance Training. Prior to designing successful instructional events, the instructional analysis is conducted to determine how content information may be selected, structured, sequenced, and presented to the learner in a manner consistent with his or her dominant learning style (Visser, 1997). For example, an individual may learn more effectively through visual interaction rather than aural stimuli. Such information strengthens the subsequent design of instructional events and related instructional materials to meet the learning needs of the audience member. In this example, a teaching strategy would be employed which utilizes models and diagrams (rather than lectures or audiotapes) to teach the content.

Instructional events can be thought of as having three primary components: an introduction to the instruction, a body of activity, and a conclusion to the learning experience (Alessi and Trollip, 1991). The introduction describes pre-instructional activities and sets the frame-of-reference for learning. Pre-instructional activities may establish motivational level of participants or engage participants in prerequisite skill development. The frame of reference for learning may be established through the use of an advanced organizer or demonstration of performance outcomes. The introduction of the instructional event sets learner expectations and identifies protocol and procedures for participation in instructional activities.

The body of an instructional event can be thought of as containing five features: (a) presentation of content information, (b) guidance of the learner, (c) elicitation of learner input and response, (d) providing feedback, and (e) evaluation of mastery of business-driven performance objectives. The presentation of content information may be defined by instructional methodology or a specific instructional learning objective. For example, if the instructor is teaching a skill, he or she may model completion of the task. Respectively, if the instructor is facilitating learning verbal information, he or she may present rules and examples of discrimination or provide other nonverbal information (Alessi and Trollip, 1991; Dick and Carey, 1996).

Guiding the learner and eliciting learner input and response is often defined by instructor-led activities although guided discovery is also an effective instructional strategy. Once the participant in the distance learning event observes the presentation of information or experiences in some way transmission of content, he or she may respond. Depending on the instructional materials, learners may be engaged to answer questions about factual information, apply rules and principles to solve problems, or practice procedural tasks (Alessi and Trollip, 1991). Guiding the learner and eliciting learner response during a distance learning event

include varying levels of student-student collaboration, student-instructor interaction, student-materials interaction, and access to or control of learning stimuli.

Finally, providing feedback to the distance learning participant facilitates instructor-student interaction, further engages the individual, and increases motivation for ongoing practice and long-term retention of skills and knowledge by the learner. It is also in this aspect of design of distance learning instructional events that evaluation is provided to the learner regarding his or her ongoing mastery of the business-driven performance objectives.

The conclusion of the distance training instructional event is designed similarly to the final stages of the body, such that feedback is provided to the learner and performance outcomes are evaluated. The significance of the conclusion of the instructional event is the inclusion of a statement reiterating intended learning objectives, a review of the more salient concepts and issues related to the learning event, and a summative evaluation of learner performance. This final assessment of performance enables future remediation or enhancement, depending on whether the participant exhibits the identified performance outcomes.

Upon review of the preceeding discussion, it becomes apparent that embedded within the design structure of instructional events lie three primary characteristics that influence effective development of distance education and training. These include (a) type and level of interaction, (b) synchronicity of the interaction and personal communication, and (c) locus of control over content and pace of instruction (Berge and Collins, 1995c; Mackin and Hoffman, 1997; Mantyla and Gividen, 1997; and Moore and Kearsley, 1996). There are four types of learner interaction: learner-learner, learner-instructor, learner-content, and learner-interface (Mackin and Hoffman, 1997; Moore and Kearsley, 1996); two modes of communication: synchronous and asynchronous (Berge and Collins, 1995c); and two primary loci of control: internal or student-maintained versus external or instructor-maintained (Berge and Collins, 1995c; Schreiber, 1996).

Instructional events for adult distance learners are strengthened by increased levels of learner-learner and learner-instructor interactions and maintaining learner-centered or learner control over content and pace of instruction. Both synchronous and asynchronous communication are appropriate, depending on the selection of instructional delivery technology and the design of instructional materials.

Learner-learner and learner-instructor interactions are increased when instructional events incorporate activities that encourage dialogue and engage learners with questions and discussions, role-play, and other collaborative efforts. The Interactivity Guide Pyramid (Mantyla and Gividen, 1997) describes a balanced mix of activities that may be integrated into the instructional design of the distance training event to enhance learning. These activities include case studies, storytelling, debates, and simulations.

Finally, learner-interface interaction is improved when an instructional event ensures limited distraction from side-effects of technology or from hardware or software demands. For example, when using live two-way interactive video transmissions, post a still image or picture on the monitor screen during off-line student activities. Or if the internet is being utilized to provide an online course, effectively plan and prepare uploading instructional materials and documents so software and hardware compatibility exists and student access is strong and downloading uneventful. The learner-interface interaction, described by Mackin and Hoffman (1997) as the learner's adjustment to the distance learning environment (defined by a particular technological learning platform), is strengthened by improved utilization of delivery technology.

Successful distance training occurs when instructional events complement or reinforce a selected model for learning. For example, if the goal of a distance training event is to improve information transformation, an instructional strategy must be developed that facilitates social interaction and constructivist learning. The technology used to deliver the information and aid instruction must provide strong interaction and socialization. In this example, the Internet may successfully deliver the distance training, as long as the instructional materials and instructional events are designed appropriately. However, if significant interpersonal skills development is needed (such as skills needed for team-building), live two-way video interaction with limited numbers of remote sites may more effectively deliver the distance training event and facilitate mastery of the performance objectives.

Accommodate (Organizational) Technology Plan

A new generation of technological advancements has resulted in the availability of an eclectic array of hardware and software that an organization may use to deliver distance training. These are the same technologies a corporation or agency uses to process data, manage personnel and human resource services, and communicate electronically. It is the front-end costs however and lack of design and implementation plans for facilitating learning at a distance that thwart an organization's procurement, practice, and utilization of technology for distance training.

Step Four of the IDM-DT provides a number of suggestions and tasks that aid in the procurement, use, and integration of organizational technology for delivering distance and distributed learning. Field experiences indicate that there are two over-riding influences that affect identification and selection of technology for specific distance training events and programs. One influence comes from the instructional design needs of distance learning; the other is generated from organizational characteristics and business needs of corporations and agencies.

The following discussion provides a two-prong approach to strengthening an organization's efforts to procure, utilize, and integrate technology for delivering

distance and distributed learning. One approach is driven by instructional needs of distance learning. This strategy identifies and selects instructional technology based on a set of learning and usability criteria. The other approach is based on organizational and business needs. This strategy examines corporation and agency characteristics and how they affect identification, selection, and procurement of technology for distance training.

While companies strive for a seamless integration of organizational technology, corporate (executive and operations) officers scrutinize purchases and return on investment closely. Organizations are demanding clear justification for significant expenditures on hardware and software.

Business-Driven Procurement and Utilization of Organizational Technology for Distance Training. Current organizational attempts at online and distance learning have resulted in less than desired outcomes (Picard, 1996; Green, 1997). There is an identified business need to deliver training faster, cheaper, and more effectively. Yet most organizational efforts to provide distance learning have been improvised with little institutional planning. Often organizations look to computing services to provide technical support services and instructional integration of content. Pedagogical applications and instructional personnel are considered marginal costs. And utilization of organizational technology for instructional purposes competes for existing resources along with all other technological applications within the corporation or agency (Green, 1997; Schreiber, 1996).

Research and personal field experiences suggest that solutions exist to help strengthen an organization's practices and procedures for procurement and utilization of technology for distance learning (Cronin, 1994; Green, 1997; Schreiber, 1996). Two of these solutions are (a) developing and implementing an organizational Technology Plan and (b) creating and recognizing an interdisciplinary Distance Learning Core Steering Committee.

An organization's technology plan guides decision-making regarding procurement and utilization of technology. It provides policies and procedures for analyzing cost-benefits, allocating resources, and controlling budgets. A well-developed technology plan is a component of an organization's mission and strategic statements, and is defined relative to the organization's business goals, initiatives and challenges for the near-future (Green, 1997).

A strong organizational technology plan is characterized by the following criteria (these traits were identified from review of related literature by Cronin, 1994; Green, 1997; Picard, 1996; Schreiber, 1996):

- A description of how technology will support, facilitate, and sustain the organization's business goals, initiatives, and challenges for the next three to five years;

- A statement of the options for what technologies will enable accomplishment of the how described previously;
- A statement recognizing distance and online education and training as a distinct identity with its special mix of pedagogy, customer and audience, and products;
- A statement of specific guiding principles for ongoing technological improvement in the organization to accommodate and propagate flexibility and changing business initiatives and challenges; this statement is less broad than the organization's mission and vision statements;
- A statement of strategic and tactical goals to engage benefits from cutting-edge and innovative advances in communication technologies supporting distance education and training;
- A clear description of associated core costs (*cost of doing business*) and marginal costs (*non-documented overhead* or *embedded costs*, costs bundled into an already existing core account); and
- A description of line item expenditures for the following core costs: distance training course design, materials development, distance delivery skills training, computing services' support of distance learning users and providers, and computing services' support of integration of instruction.

In addition to these characteristics, an organization's technology plan should include (a) an overall financial plan for routine amortization and replacement of computers, software, and other key hardware and software components, (b) a defined role for information technology and www resources in the distance learning effort, and (c) a strategic plan for the role of information technology in instruction and distance training, as well as dissemination of information that is content specific.

The extent to which the technology plan described here becomes implemented depends on an organization's structural and functional capability to support the effort. The probability that an organization's technology plan will be effectively implemented in support of distance training increases significantly with the presence of an interdisciplinary Distance Learning Core Steering Committee.

A Distance Learning Core Steering Committee (or simply, any interdisciplinary team charged with support and service of maximizing utilization of organizational technology) is often created by one of the following three procedures: (a) an executive appointment, (b) induction by an organizational task force, or (c) reactivation by organizational demand. This interdisciplinary team is made up of members from various functions within the organization, including executive management, information technology, network services, broadcasting and or communications, instructional design, training, and performance consulting areas.

In addition to the members permanently appointed to a Distance Learning Core Steering Committee (or similar team), there are floating members engaged for specific applications and implementation. Two categories of floating membership are subject matter experts and end-users or members of a specific target audience. The composition of a corporation or agency Distance Learning Core Steering Committee (or similar team) depends on an organization's size, resources, and organizational structure.

Technology plans evolve and take on unique characteristics as an organization's level of maturity grows regarding its technological capability to provide distance training. The supporting interdisciplinary distance learning team becomes more sophisticated in providing services and facilitating ongoing implementations of distance and distributed learning.

In less-evolved organizational environments, a technology plan is recognized only on a functional or departmental level, and often there are several of these plans circulating throughout the company or agency. A duplication of distance training efforts results, sometimes resulting in outcomes that are at cross-purposes with the organization's goals. Costs are covered by individual budgets; there is limited integration among efforts; and return-on-investment decreases.

The goal is to develop, implement, and sustain a technology plan at an organizational level and facilitate interdisciplinary contributions from the Distance Learning Core Steering Committee.

Instructional Design-Driven Identification and Selection of Technology for Distance Training. As an organization's technology plan becomes recognized and the interdisciplinary distance learning team coordinates development and implementation of distance training events, decisions must be made regarding which technology is most effective in delivering what type of distance instruction. A continuing debate among instructional designers ensues, however, regarding the appropriate time (during the process of design and development of distance training) to identify and select technology to deliver distance and distributed learning.

Some researchers proclaim that learner characteristics and the design of instructional events must be considered long before any delivery technology is selected (Reed, 1996; Fortenbaugh, 1997). Others argue that technological media are merely vehicles for delivering instruction and do not influence directly student achievement (Schlosser and Anderson, 1994; Portway and Lane, 1994). The answer not unexpectedly lies somewhere in between. All instructional technologies possess strengths and weaknesses and the most effectively implemented distance training events and programs maximize utilization of the chosen (or available) delivery medium. The guiding principle is to design instructional events that are consistent with and fully use the strengths of the delivery technology.

Maximizing utilization of technology for distance training is characterized by a clear concise understanding of instructional goals and performance outcomes and subsequently designed instructional events and instructional materials consistent with the chosen medium. The key is to work with rather than against the capabilities of the technology.

All technologies possess unique capabilities. For example, a primary strength of the Internet is its ability to deliver instruction and engage learner interaction in an environment that does not require students and instructor present together at a specific time or geographic location (Berge and Collins, 1995c). Teaching and learning activities are available upon request with minimum constraint to access. Optimizing utilization of the Internet is then represented by instructional events that facilitate social interaction and constructivist learning (Berge and Collins, 1995c), as long as instructional strategies include processes and procedures for participant meditation and reflection on content issues.

The strengths and weakness of technology for delivering distance education and training can be described through an assessment of the medium's usability characteristics. (A *usability characteristic* may be type and level of interactivity or user access.) In contrast to the preceeding example, the strengths of live interactive video communication include real-time visual interaction that fosters cultural indoctrination, common language-building, and immediately available feedback to and from the instructor and students (Berge and Collins, 1995c; Schreiber, 1995a). Consequently, if a performance need exists to build such interpersonal skills, then utilization of the delivery medium of live interactive two-way video is an appropriate selection. (Note however that interaction is maximized during live two-way video communication when the number of remote sites is limited to six [Schreiber, 1995a].)

For review of the strengths and weakness of multiple technology delivery tools, see Table 3.1: Technology Selection Criteria Matrix. This matrix correlates technology delivery tools to specific characteristics of distance training. Usability criteria drive the correlations.

The technologies examined in Table 3.1 include (a) the Internet (intranet/extranet), (b) satellites, (c) fiber optics, (d) CD-ROM and laser disks, (e) audiotapes and videotapes, and (f) printed materials. The associated instructional applications include (a) web-based computer-based training (CBT) and online courses, (b) electronic performance support systems, (c) high fidelity broadcasts and teleconferencing, (d) digital compressed video transmissions, as well as analog communications, (e) independent computer-based training, (f) audio-video recorded lectures, and (g) texts, handbooks, and manuals. And the usability criteria that determine the strengths and weaknesses of various organizational technologies for communication and training at a distance include (a) type and level of interactivity,

(b) costs of design and implementation, (c) user access to distance learning technology, (d) learner style, and (e) type of intended learning outcome (such as acquisition of knowledge, skill-building, or attitudinal change).

Correlate Distance Learning Instructional Materials to Technology Delivery Tools

Maximizing utilization of technology for distance training is characterized by a clear concise understanding of instructional goals and performance outcomes and subsequently designed instructional events and instructional materials consistent with the chosen medium. Instructional materials may be a variety of electronic and paper-based text and graphics, as well as three-dimensional models and other manipulatives. CBT materials may also be employed. The key is to design instructional materials that work with rather than against the capabilities of the technology.

Step Five of the Instructional Design Model for Distance Training describes effective design and integration of instructional materials with delivery technology. Maximizing the use of technology to implement distance learning relies on how consistent the instructional materials are with the strengths of the hardware and software employed to deliver the training. The following paragraphs describe the correlation of instructional materials and two primary distance training technologies: interactive television and the Internet.

Interactive Television Technology Live interactive video conferencing permits two-way audio and one- or two-way video communication (see Table 3.1). The effectiveness of this technology to deliver distance training to both visual learners and verbal learners depends on how well the instructional materials are designed to utilize both the live video and audio capabilities of the technology.

Visual learners respond to pictures and graphics, while verbal learners respond to voice and text (Schaaf, 1997). Instructional materials used with live interactive video technology include presentation slides, charts and graphs, videotapes, and three-dimensional objects. Presentation slides, charts, and graphs may be presented on diskette or projected via a document camera. The design of these visuals should be as simple as possible. A learner is more fully engaged by the presentation of a limited amount of information (Alessi and Trollip, 1991). (Detailed information may be distributed in a handout.) As Ostendorf (1994) proclaims . . . when in doubt, leave it out . . . .

Presentation slides, charts, and graphics delivered via interactive television technology are most effective when designed within the following parameters (Alessiand Trollip, 1991; Ostendorf, 1994; Portway and Lane, 1994; Schreiber, 1995a):

TABLE 3.1. TECHNOLOGY SELECTION CRITERIA MATRIX.

Implementation: Learning/Teaching Characteristic[1]	*Internet* EPSS	*Internet* [Intranet/Extranet] Online Courses	*Internet* Email	Satellite [wide band 1-way video]
Access (User)		information dial-up (hardware/software compatibility)		formal/ prescheduled
Audience (Size)		asynchronous: unlimited synchronous: ≤8 remote sites		
Cost: Communication[2]		----minimal----		high
Cost: Start-up		----organizational shared cost----		high
Fidelity: Audio		low-medium fidelity sound		high fidelity sound
Fidelity: Video		low-medium fidelity motion		full motion
Instructional Adaptability		can support learning style		can support learning style
Instructional Methodology		student-centered and instructor-led		instructor-led
Instructional Strategy		information dissemination, Q&A, interactive discussion		lecture, presentation of info on policy/ procedures
Interaction: Type/Level		significant student-student and student-instructor		low student-student and medium student-instructor
Learning Outcome (K, S, A)[3]		----K, S, and/or A ----		primarily knowledge-based
Scheduling: Synch/Asynch		--asynch/synchronous--		live or pre-recorded
Support Service Need:		----minimal----		extensive
Update Capability		----just-in-time----		just-in-time

1. Information compiled from contributing case studies and other field experiences.
2. See Chapter Two and related case studies for detailed discussion about cost-benefit analysis.
3. K = knowledge, S = skill and A = attitude

Land Lines/ Fiber Optics [compressed 2-way video]	CD-Rom/ Laser Disks [CBT]	Audiotape/ Videotape	Printed Material
informal dial-up	manual distribution (hardware/ software needed)	unconstrained (hardware needed)	unconstrained distribution
~ 6 remote sites (18–20 learners per site)	unlimited	unlimited	unlimited
low-medium	NA	NA	NA
medium	low-medium	low	low
high fidelity sound	high fidelity sound	high fidelity sound	NA
medium-full motion	high quality graphics	full motion	NA
can support learning style	supports remedial learning	minimal support of learning style	minimal support of learning style
student-centered and instructor-led	self-paced	self-paced	self-paced
role-play, Q&A, interactive discussion, demonstration	tutorial, drill & practice, simulations	presentation of information	presentation of information
significant student-student and student-instructor	medium interaction student and mat'ls	NA	NA
K, S, and/or A	K, S, and/or A	K, A	K
live	NA	NA	NA
medium	minimal	minimal	NA
just-in-time	medium flexibility	inflexible	inflexible

- A maximum of five to eight lines per slide
- Approximately six words per line (36–48 words) per slide
- Type size of twenty–twenty-six points high
- Bold lettering
- One and a half to two times more space between lines
- No more than three types styles (fonts) per page
- No more than three colors per page

Delivering distance training via interactive television technology relies heavily on use of cameras to project instructional materials. These instructional materials may include 11-inch by 8 and 1y2-inch presentation overheads, or 14-inch by 17-inch flip charts. When a document camera is used, the lens should be set at an appropriate zoom angle; if the zoom is too wide, details will be lost. If the materials include presentation overheads, the visuals should be properly centered with text positioned horizontally across the screen. If the materials include flip charts (avoid blackboards and marlite boards), write with very thick markers (avoiding pale colors). Whatever the case, be sure the camera lens is positioned so the instructor's arm or body does not block the view (Ostendorf, 1994; Portway and Lane, 1994).

Distance learning instructional materials may include videotapes for use with interactive television technology. If this is the desire, sound may be the most important parameter of the technology that determines effective use of the instructional material. Be sure microphones are positioned appropriately throughout the room, either hung from the ceiling or stationed on tabletops. If microphones are grated or toned down, be sure the videotape sound is not obscured. Finally, decrease room echoes and increase quality for receiving sound via the audio/videotape by using acoustically absorbent rather than reflective surfaces. Use drapes over exposed glass.

Internet/Intranet Technology Instructional materials consistent with the strengths of the Internet/intranet include a variety of electronic text and graphics, as well as computer-based training materials. In an online course, for example, a lecture may take the form of text posted to a bulletin board. The posting may contain complete articles, excerpts from articles or texts, and questions and answers prepared for follow-up discussion (Paulsen, 1995). Internet/intranet-based courses may provide access to online resources through a web page. Some of these resources may be bookmarked by the instructor; others can be provided as optional readings.

In addition to online lecture slides, research papers, instructors' notes, tutorials, and tests may be posted. Slides on demand may be available via electronic

libraries (Elangovan, 1996). The use of a mailing list aids in distribution of materials, as well as serving as a vehicle for electronic announcements. Students may be guided through synchronous and asynchronous online "chats" with USENET and other associated discussion groups (Elangovan, 1996).

Computer-based training products may also be used as instructional materials for online courses. These products may be distributed in a self-contained CD-ROM format or accessed via the Internet/intranet. Regarding the integration of computer-based training instructional materials with internet/intranet technology, beware of incompatibilities. High-end multimedia CBT requires large amounts of computer memory, audio/video boards, and high-speed connectivity for transmission.

A final consideration to ensure successful correlation of instructional materials and technology tools for delivery of distance training is the human factor effect. Instructors and other distance learning facilitators who may be inexperienced with technology must learn and respect the unique requirements and parameters of hardware and software, as well as the learning environment that will be used to deliver instructional materials. For example, a distance learning event transmitted via television (one- or two-way video) can be viewed by a participant as something that may be "tuned-out" at any time (Ostendorf, 1994). If presentation slides used in this medium are not visually engaging or are designed inappropriately with conflicting text and color layouts, then the instructional materials fail to facilitate maximum use of the technology. Similarly, if presentation slides are posted for an Internet/intranet-based online course and the phrases are abridged or ambiguous or supplemental text resources are omitted, then again the instructional materials do not maximize utilization of the technology.

Secure Implementation Support For Balanced Roll-Out Strategy

Corporations and agencies that implement successful distance training that contributes strategically to the organization exhibit coordinated support from multiple functions within the institution. Education specialists, subject matter experts, information systems engineers, communications professionals, and executive managers interact collaboratively as corporate facilitators of distance and distributed learning. As indicated earlier in discussion of the IDM-DT (refer to Step Four), this collective behavior is ultimately facilitated by an organization's Distance Learning Core Steering Committee (or similar organizational team).

Step six of the IDM-DT examines the processes and procedures in which an organization must engage to secure implementation support for distance training at an institutional level. Change-management and transition-management

theories are discussed. These theories provide a foundation upon which an organization can evolve the necessary sophisticated, interdisciplinary, and broad-based support behaviors needed for strategic application of business-driven distance and distributed learning.

(Note: The following discussion results from the application of change-management theory and transition-management theory to securing organizational support for implementation of distance and distributed learning. The initial research on organizations and management by Robinson and Robinson (1996) and Bridges (1988) provides a foundation for this application.)

Understanding transition-management theory aids in securing organizational support for implementation of strategic applications of distance training. However, prior to this discussion it is important to note that an organization's potential for success in delivering strategic distance training relies on attainment of certain sophisticated behaviors. These behaviors include (a) proactive institutional planning for design, development and delivery of distance events and programs; (b) organizational recognition of distance training as a unique entity with specific products and services and subsequently independent budgetary needs; (c) availability of organizational computing services and technical support services for implementation and evaluation; and (d) collaborative contributions by interdisciplinary groups, including subject matter experts, end-users (participants in the distance training events), and instructional designers.

Three additional organizational phenomena impact effectiveness with which institutional support is secured for implementation of distance training. These include (a) identification and recognition of business-driven distance learning goals and objectives, (b) presence of an organization interdisciplinary distance learning team, and (c) active maintenance of an organization technology plan.

It is ultimately the interdisciplinary distance learning team that takes responsibility for negotiating and securing organizational support for implementation of distance learning. And although the organizational state (as described in the previous paragraph) is the desired condition, most often the distance learning core team must move the organization to this state as implementation support is pursued. Securing support for strategic distance learning occurs by preparing, monitoring, and facilitating implementation of distance training events and programs.

Preparing the company or agency to support strategic application of distance training requires that the distance learning core team describe in the most fundamental terms the innovations occurring with implementation of the event(s). The core team should look ahead and identify those individuals and groups most affected by the implementation process and communicate evolving roles and responsibilities associated with this implementation.

In the case of distance learning, information systems staff and computing services personnel are key individuals to securing organizational support for distance training events and programs. The core team should assess the transition-readiness of this group and determine appropriate activities to engage them in support of the implementation process (Bridges, 1988). The readiness of the group to provide implementation support is a measure of the group's structural flexibility, procurement practices, and identity with the organization's technology plan. The more flexible the function's structure, the more decentralized its procurement practices, and the stronger its identity with the organization's technology plan, the more ready the group is to support the implementation of strategic distance training at an organizational level.

The next phase of securing organizational support for implementation of strategic distance and distributed learning is driven by what happens to individuals and the organization during the implementation period. These happenings may be foreseen or not, depending on the level of maturity of the implementation process and how predictable implementation procedures are. Such incidents may include unexpected disruption of standard practices and procedures and inadequate flow of information from management and the distance learning core team across functions of the organization, as well as up and down the hierarchical structure of the organization and perceived (or real) inconsistencies with (former) cultural orientation of the corporation or agency.

The second phase of activities that facilitate securing organization support of distance training falls into the category of monitoring the progress of the implementation. The responsibility of the distance learning core team at this stage is to observe the distance training activities, anticipate weaknesses in the implementation process, and head off unexpected incidents (such as previously described). For example, if the organization's standard budgetary practice for covering delivery costs associated with instructional technology traditionally resulted in independent function expenditures and now a strategic application of distance learning event requires group budgeting (perhaps involving computer services and technical support as well as training and performance enhancement departments), then the distance learning core team must recognize the new phenomenon, increase communication across associated functions, build awareness, negotiate collaboration, and remedy any confusion or disgruntlement regarding roles and responsibilities.

The final phase of securing organizational support for implementation of strategic distance and distributed learning requires a strong application of facilitation processes. *Facilitation processes* include activities that (a) increase the ease of transition, (b) lower the intensity of opposition or obstacles, and (c) provide ongoing stimulation of "a" and "b." At this stage, the distance learning core team may set a challenging but realistic pace for accomplishment of an identified

distance training event or program. Securing implementation support for the timeline will be strengthened however if the necessary support functions in the organization have been engaged during the decision-making process.

Additional tasks for the distance learning core team during this phase of securing implementation support include creating incentives or rewards for both short-term and long-term involvement by related organizational functions (computer services and technical support, as well as training and performance enhancement departments), and reviewing, updating, and reinforcing the communication plan (implemented in earlier stages). The communication plan investigates communication resources within the agency or institution, identifies communication channels, communicates the timeline for roll-out, and ultimately engages interdepartmental support and organizational-level support for implementation of strategic distance and distributed learning.

The ultimate goal of this stage of the instructional design model for developing strategic distance training is to establish an implementation process that is stable and predictable but not inflexible. Once this process is in place, the organization can evolve to institutionalize its efforts. (See the Introduction and the related discussion of organizational technological capability maturity for implementing distance learning.)

Evaluate Distance Training Processes and Measure Transfer

Step Seven, the final step in the IDM-DT process, describes how to evaluate delivery of distance training instructional events and programs, as well as the instructional design model itself for developing distance and distributed learning. Measuring transfer of information and the knowledge and skills for successful attainment of business-driven performance outcomes is also discussed. Formative and summative assessments provide the primary vehicles for evaluation.

Both formative and summative assessments represent important operations of the overall distance learning model. Formative assessment maps the ongoing design and implementation of distance training and determines the impact of materials development and selection of instructional technology on one another and on the general process. Formative assessment also includes reiterative review of all components of the distance learning system with primary focus on the learner, instructor, learning environment, instructional delivery technology, and organizational culture. Formative evaluations provide continuous feedback to developers to improve design and implementation of the ultimate distance training event or program.

Summative assessment as a final evaluation determines the overall strengths and weaknesses of the distance training effort. Summative evaluations may be

embedded within a distance training course or event to assess instructor capability, student or participant interaction, user-access to delivery technology, remote site characteristics, and final instructional materials used for the instructional event. Summative evaluation of a distance learning program integrates systematic collection of data over time. The goal of summative assessment of a distance training event or program is to evaluate overall instruction and learning at a distance.

Conclusion

Applying a systems processing approach to the development and delivery of distance and distributed education and training provides a strategy for understanding the roles of the student located at a remote site and the instructor designing materials to be delivered at a distance over some technical medium. The instructional design model developed in this chapter, IDM-DT, enables investigation of the relationships between and among various elements of the process, including in addition to the student and instructor the learning environment (for example, site planning for a satellite broadcast or desktop access), the instructional technology (compressed video or Internet), and culture of the institution or agency (including level of organizational technology capability for providing distance training).

The IDM-DT provides a strategy for accounting for all the components of a distance learning instructional process, as well as explaining the role each component plays within a given instructional event or program.

Employing a reiterative process of analysis and design to develop strategic distance learning also helps to maximize utilization of technology and institutionalize an organization's efforts. Instructional needs and performance outcomes of a distance training event or program become defined by business goals and objectives. The impact of organizational culture, as well as internal corporate dynamics, are understood, accounted for, and accommodated.