

A Systematic Approach to Media Selection

**William W. Lee
and
Diana Owens**

TABLE OF CONTENTS

TABLE OF CONTENTS	ii
MEDIA ANALYSIS MODEL	1
Organizational Assessment.....	2
Information Structure and Objectives.....	2
Media Selection	2
Cost Analysis.....	2
ORIGINS OF THE MODEL.....	2
COMPONENTS OF THE MODEL.....	3
Organizational Assessment.....	3
Information Structure/Objectives	5
Media Analysis.....	6
MEDIA ANALYSIS RATING SCALE.....	7
MEDIA ANALYSIS SUMMARY SHEET	14
COST.....	20
VALIDITY MEASURES.....	20
SUMMARY	21
REFERENCES.....	22
BIOGRAPHIES.....	23

MEDIA ANALYSIS MODEL

A systemic view of media selection involves more than looking at the training aspects of a business issue or problem. It involves four components that form a Media Analysis Model with accompanying tools. The components are:

1. Organizational Assessment
2. Information Structure and Objectives
3. Media Selection
4. Cost Analysis

Table 1 — Media Analysis Model

<i>Organizational Assessment</i>	<i>Information Structure/ Objectives</i>	<i>Delivery Media</i>	<i>Cost</i>
Systemic <ul style="list-style-type: none"> • Retention • Incentives • Corporate Culture • Decision-Making • Approval Levels • Communication 	<ul style="list-style-type: none"> • Principles • Concepts • Processes • Procedures • Facts 	<ul style="list-style-type: none"> • Classroom • Computer-Based • Web-Based • Satellite Broadcast • Performance Support 	<ul style="list-style-type: none"> • Cost-Benefit Analysis • Internal Rate of Return • Return on Investment
Performance <ul style="list-style-type: none"> • Work Environment • Tools • Processes/ Procedures • Expectations • Emphasis 	<ul style="list-style-type: none"> • Principles • Concepts • Processes • Procedures • Facts 	<ul style="list-style-type: none"> • Classroom • Computer-Based • Web-Based • Satellite Broadcast • Performance Support 	<ul style="list-style-type: none"> • Cost-Benefit Analysis • Internal Rate of Return • Return on Investment
Training <ul style="list-style-type: none"> • Knowledge • Skills • Attitudes 	<ul style="list-style-type: none"> • Principles • Concepts • Processes • Procedures • Facts 	<ul style="list-style-type: none"> • Classroom • Computer-Based • Web-Based • Satellite Broadcast • Performance Support 	<ul style="list-style-type: none"> • Cost-Benefit Analysis • Internal Rate of Return • Return on Investment

Organizational Assessment

An organizational assessment requires examining and re-examining human performance and systemic organizational issues involved in a business matter before considering any training that might be required. In order to ensure that performance will improve, all contributing factors must be analyzed and addressed at the appropriate levels of the organization.

Information Structure and Objectives

Once a human performance outcome is determined, it becomes a component of the proposed solution. Next, the information structure and objectives for the desired outcome must be developed. *Information structure* is the categorization and segregation of information into objectives. Finally, *objectives* based on the structure of the information must be linked to media characteristics.

Media Selection

The media selection component involves considering the instructional, student, and cost aspects of each information structure and objectives category. Many decisions are made by considering the end users as well as the cost-benefit of the solution.

Cost Analysis

Cost analysis involves determining if the eventual Return On Investment (ROI) justifies the cost of designing, developing, and implementing the human performance solution.

ORIGINS OF THE MODEL

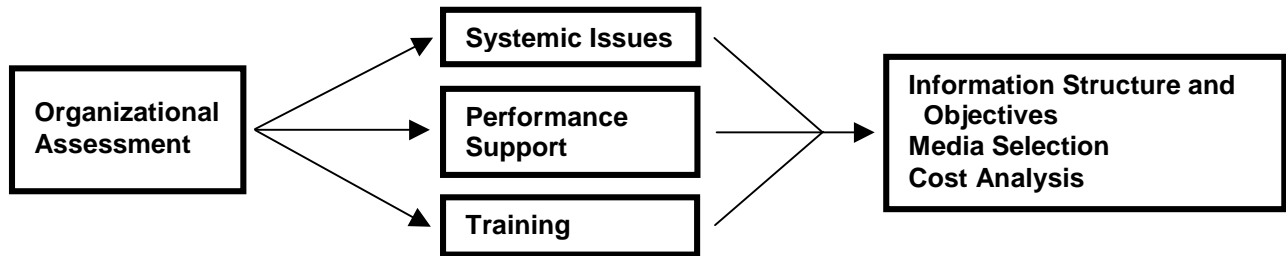
The Media Analysis Model is a human performance model patterned after principles of human performance theory. The model is a synthesis of work from the cognitive sciences, including the cognitive mapping work of M. David Merrill (1992), the learned capabilities research of Robert Gagné (1985), the process engineering of Hammer and Champy (1994), and the human performance principles of Thomas Gilbert (1996).

COMPONENTS OF THE MODEL

Organizational Assessment

Multiple factors within an organization impact the success of solutions to business issues. An organizational assessment examines three aspects of business issues (Figure 1).

Figure 1 — Media Analysis Model



At the systemic level, the model considers the following elements:

- **Retention** — Personnel turn-over in an organization
- **Incentives** — The company's reward system
- **Corporate Culture** — The value an organization places on its people, partners, and customers
- **Decision-Making Levels** — How many levels of management an organization contains (e.g., is the organization flat or hierarchical?)
- **Approval Levels** — The level of authority at which decisions are made
- **Communication** — The way that information flows up and down in the organization (i.e., how and how much information is shared)

Examining performance issues requires the discovery of the following elements:

- **Work Environment** — The physical conditions under which people do their work
- **Tools** — The equipment available to accomplish work
- **Processes and Procedures** — The systematic methodologies in place that inform people how to accomplish their work

- **Expectations** — Criteria that constitute the perceived standards for a task or job
- **Emphasis** — Quality standards (e.g., is there a zero-defect model or is the objective just to get the product out the door?)

Training is the transfer of:

- **Knowledge** — The information inherent in the issue
- **Skills** — The physical and psychomotor capabilities required to complete a job
- **Attitudes** — The affective elements that provide the motivation or desire to do a job

Addressing each element discovered during the organizational assessment begins in one of the following places:

- At the *highest level* (systemic) working downward to specific training issues that might be required
- At *each level*, addressing common elements among levels

The following is an example of addressing elements at *each level*:

Company X needs to get products to market much more quickly to retain its market share. Speed-to-market for its closest competitor is six months faster than for Company X. Among other issues, Company X has identified that the number of approvals required before any purchase of equipment can be made takes four months. This delay makes it impossible for the company to leverage any purchasing power, as bids from vendors are good for only three months. By the time all the required signatures are obtained, the bid is no longer valid. Purchasing must re-bid and go through the same process. At the performance level, Company X must first redesign its process for gaining signatures to reduce turnaround to at least the duration of the valid bid, more if possible. There is no training involved in this aspect, only a performance and systemic issue.

Another issue that is affected by delays in the purchasing process is the tendency for the tools required to automate the system, which improve the speed-to-market, to be outdated by the time they arrive, as these tools change on a two-month upgrade cycle. Therefore, there is no advantage in training employees to use the tools.

Information Structure/Objectives

After completing the organizational assessment, the model requires examining the findings and determining the structure of the information obtained. All information can be categorized into one of the following groups, with any one issue involving the interaction of many:

- **Principles** — Guiding principles, such as vision, mission, and ethics
- **Concepts** — Ideas and definitions
- **Processes** — Systematic ways work gets done
- **Procedures** — Steps for completing a job or task contained within a process
- **Facts** — Discrete pieces of information

Categorizing information in this way permits moving forward to establish the objectives for an issue's solution. Objectives are arranged into a logical structure using the interconnections among pieces of information. The following worksheet tracks the information derived from organizational assessment and form objectives.

Table 2 — Information Structure/Objective Worksheet

<i>Type of Information</i>	<i>Definition</i>	<i>Information From Analysis</i>
Principles	Guiding forces, such as vision, mission, and ethics	
Concepts	Ideas and definitions	
Processes	Systematic ways work gets done	
Procedures	Steps for completing a job or task contained within a process	
Facts	Discrete pieces of information	

Media Analysis

Once content is defined and objectives are written, the delivery media can be determined. There are two major factors to consider:

- Cost
- Instructional/Student Factors

All factors and considerations involving media are illustrated in the media analysis tool (see *Media Analysis Rating Scale*). Complete instructions on how to use the paper-based version of the media analysis tool are included. An online version of the tool has been developed by Idea Integration's branch offices in Dallas, Texas and Jacksonville, Florida and is available on their Web site at www.idea.com.

MEDIA ANALYSIS RATING SCALE

Instructions

Complete the rating scale as follows:

1. Using the key provided, consider the importance of each factor on the rating scale to the situation that you are analyzing.
2. Use the summary sheet to tally the number of occurrences of each medium that you ranked as a 4 or 5.
3. Tally each medium that you ranked as a 1 or 2 (ignore those ranked as 3).
4. Subtract the number of Low Occurrences from the High Occurrences and record that number in the Difference column.
5. Determine the weight of the difference by dividing the Difference column with the All Occurrences column and record that percentage in the Weight column.
6. The media with the highest-weighted averages are probably the most appropriate media for your solution.

Rating Scale

5 = Very Important Consideration

4 = Important Consideration

3 = Neutral Consideration

2 = Unimportant Consideration

1 = Not A Consideration At All

Table 3 — Instructional/Student Factors Rating Sheet

<i>Instructional/ Student Factors</i>	<i>Considerations</i>	<i>Suggested Media</i>
<p>1 2 3 4 5</p> <p>Content requires interactivity (computer)</p>	<p>Does the content involve computer software, simulation, or practice?</p> <p>Computer-based training simulations can facilitate learning.</p>	<p>Computer-based</p> <p>Web-based</p>
<p>1 2 3 4 5</p> <p>Incidental learning may occur</p>	<p>Do you need to control for incidental learning?</p>	<p>Instructor-led</p> <p>Satellite broadcast</p> <p>Video teleconference</p>
<p>1 2 3 4 5</p> <p>Collaborative learning is desired</p>	<p>Do group learning experiences, including opportunities to build relationships or share information, need to occur?</p>	<p>Instructor-led</p> <p>Satellite broadcast</p> <p>Video teleconference</p> <p>Web-based</p>
<p>1 2 3 4 5</p> <p>Content requires interactivity (human)</p>	<p>Will participants gain interpersonal and communication skills from immediate observer feedback about their performance?</p> <p>To what extent does the learner need to use or demonstrate interpersonal or communication skills, such as presentation, teamwork, leadership, or facilitation?</p>	<p>Instructor-led</p> <p>Satellite broadcast</p> <p>Video teleconference</p>
<p>1 2 3 4 5</p> <p>Audience requires motivation</p>	<p>How motivated are the learners?</p> <p>Note: Self-instruction or distance education requires higher intrinsic motivation for successful learning.</p>	<p>Instructor-led</p> <p>Video tapes</p> <p>Web-based</p> <p>Satellite broadcast</p>
<p>1 2 3 4 5</p> <p>Audience requires convenience — Training at or near the work site</p>	<p>Is time away from work not possible because of work schedules, project requirements, variable shifts, or time-sensitive performance?</p> <p>Are participants dispersed, requiring decentralized training?</p>	<p>Computer-based</p> <p>Video teleconference</p> <p>Performance support</p> <p>Web-based</p> <p>Audio teleconference</p>

<i>Instructional/ Student Factors</i>	<i>Considerations</i>	<i>Suggested Media</i>
<p>1 2 3 4 5</p> <p>Audience has limited access to required technology</p>	<p>What technology is available? Is there a barrier to technology?</p>	<p>Audio teleconference</p> <p>Instructor-led</p> <p>Computer-based</p>
<p>1 2 3 4 5</p> <p>Audience has limited access to required expertise</p>	<p>Is there limited expertise that must be leveraged across the organization?</p>	<p>Computer-based</p> <p>Satellite broadcast</p> <p>Video tapes</p> <p>Web-based</p> <p>Video teleconference</p>
<p>1 2 3 4 5</p> <p>Students are resistant to new media</p>	<p>How receptive is the audience to using a new medium? To what extent do attitudes toward lecture style help or hinder learning?</p> <p>Note: Learners often enjoy instructor-led training because it allows them to be with other learners. Although they enjoy it, they may learn less. They may fear technology, only have experienced mainframe Computer-Based Training (CBT), or do not want to spend more time at a computer screen. Take that fear into account and move toward a technology solution whenever possible.</p>	<p>Instructor-led</p>
<p>1 2 3 4 5</p> <p>Employees must review the information frequently</p>	<p>Will reference materials be required?</p> <p>Is there a need for “look-up” capabilities?</p>	<p>Performance support</p> <p>Web-based</p>
<p>1 2 3 4 5</p> <p>There is an immediate need for application of expertise to the job</p>	<p>How critical are the knowledge or skills to the performance of job-related tasks?</p>	<p>Performance support</p>
<p>1 2 3 4 5</p> <p>Wide variation in entry-level background</p>	<p>How wide is the gap in entry-level knowledge?</p> <p>Note: CBT provides the ability to branch users off to different levels of</p>	<p>Computer-based</p>

<i>Instructional/ Student Factors</i>	<i>Considerations</i>	<i>Suggested Media</i>
knowledge	training.	

Table 4 — Cost Factors Rating Sheet

<i>Cost Factors</i>	<i>Considerations</i>	<i>Suggested Media</i>
<p>1 2 3 4 5</p> <p>Content has a short shelf-life or changes rapidly</p>	<p>Is the content stable? Is it still under construction or development?</p> <p>How does the stability of the content affect the frequency of revisions? How difficult is it to make revisions using this medium?</p> <p>Revisions to audio tapes, video tapes, CBT, and Interactive Video Instruction (IVI) are time-consuming and expensive.</p>	<p>Video teleconference</p> <p>Audio teleconference</p> <p>Web-based</p> <p>Satellite broadcast</p> <p>Instructor-led</p>
<p>1 2 3 4 5</p> <p>Global audience — Multiple cultures or languages</p>	<p>Will reading, hearing, or understanding English be difficult for audience members?</p> <p>Are varying levels and types of information needed?</p> <p>Note: A variety of non-print media can deliver text, graphics, sound, and motion that allow for learner control.</p>	<p>Computer-based</p> <p>Satellite broadcast</p> <p>Video tapes</p>
<p>1 2 3 4 5</p> <p>Materials must be available in a variety of formats</p>	<p>Will it be necessary to re-purpose materials?</p> <p>Notes: Video can be reused in a variety of media.</p> <p>Electronic media can be delivered in a variety of formats.</p>	<p>Video tapes</p> <p>Satellite broadcast</p> <p>Video teleconference</p> <p>Computer-based</p>
<p>1 2 3 4 5</p> <p>Audience Level — Fewer than 200 per year need training/support</p>	<p>How many learners are in the target audience? What is the size of the audience over the expected shelf-life of the training?</p>	<p>Performance support</p> <p>Instructor-led</p> <p>Video teleconference</p> <p>Audio teleconference</p>
<p>1 2 3 4 5</p> <p>Must accommodate large numbers of participants — 2000 or more per four years of shelf life</p>	<p>Are there 2,000 or more participants in the target audience?</p>	<p>Satellite broadcast</p> <p>Computer-based</p> <p>Video tapes</p> <p>Audio tapes</p>

<i>Cost Factors</i>	<i>Considerations</i>	<i>Suggested Media</i>
<p>1 2 3 4 5</p> <p>Must train large numbers of employees quickly</p>	<p>How quickly must the intervention be developed?</p> <p>How much time is available to build, buy, or revise products?</p> <p>For shortened time frames, consider buying or revising existing products.</p>	<p>Video teleconference</p> <p>Audio teleconference</p> <p>Audio tapes</p> <p>Instructor-led</p> <p>Satellite broadcast</p>
<p>1 2 3 4 5</p> <p>Requires compression of training time</p>	<p>Is it important to reduce the time that participants spend in training?</p> <p>Note: CBT has typical training compression ratios of 50 to 70 percent.</p>	<p>Performance support</p> <p>Computer-based</p> <p>Satellite broadcast</p> <p>Self-paced workbook</p>
<p>1 2 3 4 5</p> <p>Keep development costs per hour of instruction low</p>	<p>What is the cost per learner for developing or acquiring this medium?</p>	<p>Video teleconference</p> <p>Audio teleconference</p> <p>Satellite broadcast</p>
<p>1 2 3 4 5</p> <p>Keep travel expenses low</p>	<p>Is travel a barrier due to budgets, distance, or business considerations?</p> <p>How can travel expenses be reduced?</p>	<p>Performance support</p> <p>Computer-based</p> <p>Web-based</p> <p>Satellite broadcast</p> <p>Self-paced workbook</p> <p>Video teleconference</p> <p>Audio teleconference</p> <p>Video tapes</p> <p>Audio tapes</p>
<p>1 2 3 4 5</p> <p>Keep implementation, delivery, and maintenance costs low</p>	<p>What are the means of distribution?</p> <p>How will changes be accomplished? Can they be made quickly and easily?</p> <p>Will changes make previous distributions out-of-date?</p>	<p>Performance support</p> <p>Video teleconference</p> <p>Audio teleconference</p> <p>Self-paced workbook</p>

<i>Cost Factors</i>	<i>Considerations</i>	<i>Suggested Media</i>
<p>1 2 3 4 5</p> <p>Testing, evaluating, or tracking student performance is necessary</p>	<p>Can the assessment be self-scored?</p> <p>Is certification necessary?</p> <p>Note: Assessing of interpersonal and communication skills requires observation. Some observation requires a trained expert.</p>	<p>Self-paced workbook</p> <p>Computer-based</p> <p>Satellite broadcast</p> <p>Instructor-led</p>
<p>1 2 3 4 5</p> <p>Tracking course completion is necessary</p>	<p>Can the media assess course completion?</p>	<p>Computer-based</p> <p>Satellite broadcast</p> <p>Instructor-led</p>

MEDIA ANALYSIS SUMMARY SHEET

After rating your responses, use the following summary sheet to tally the number of occurrences as described in the *Media Analysis Rating Scale* section.

Table 5 — Media Analysis Summary Sheet

Media Type	All Occurrences	High Occurrences	Low Occurrences	Difference	Weight
Audio tapes	3				
Audio teleconference	8				
Computer-based	12				
Satellite broadcast	15				
Instructor-led	11				
Performance support	7				
Self-paced workbook	4				
Video teleconference	12				
Video tapes	6				
Web-based	8				

Note: The numbers in the All Occurrences column describe the number of occurrences of each media type in Tables 2 and 3.

When applying the media analysis tool, do not consider the overall course or curriculum. Doing so will typically reveal that all media can be considered because, logically, all delivery media are potentially applicable to an issue of large scope.

Brief descriptions of each type of medium are required. Table 6 lists the types of media and provides an explanation of each. Table 7 lists advantages and limitations of using each medium. These advantages and limitations should factor into the decision to use any particular medium.

Table 6 — Types of Delivery Media

<i>Medium</i>	<i>Description</i>
Instructor-led	Materials intended to be presented by a teacher or facilitator. The materials may be presented in a traditional classroom setting or on the job. Presentation styles can include lectures, discussions, demonstrations, workshops, and other media types.
Computer-based	Any form of delivery involving the use of the computer. Options include Computer-Assisted Instruction (CAI), which includes printed and/or instructor materials, and exclusively computer-based instruction in which all content is presented by the computer.
Satellite broadcast Audio teleconference Video teleconference	General term for instruction that is delivered via television, telephone, or satellite to remote locations. Specific media are video and/or audio teleconferencing and interactive distance broadcasting.
Web-based	Use of the Internet or intranets to distribute training over Wide-Area Networks (WANs) or Local-Area Networks (LANs).
Audio tapes	Use of pre-recorded audio tapes to deliver instruction with or without the use of supporting materials.
Video tapes	Use of pre-recorded video to deliver instruction with or without the use of supporting materials.
Performance Support Systems/ Electronic Performance Support Systems (PSSs/EPSSs)	Job aids, either electronic or paper-based, used to provide support to persons on the job. These media do not require any formal training or instruction other than the use of the job aid tool.
Self-paced workbook	Manual or worksheet that includes instructions, goals and objectives, and any supplementary and reference materials needed to complete an exercise.

Table 7 — Advantages and Limitations of Media

<i>Media</i>	<i>Advantages</i>	<i>Limitations</i>
Instructor-led	<p>Provides social interaction.</p> <p>Useful with variably-sized audiences.</p> <p>Provides personalized feedback.</p> <p>Integrates a variety of media.</p> <p>Materials can be tailored to the group or adjusted by the instructor while in progress.</p> <p>Short development time.</p> <p>Traditional method of teaching that is comfortable for students and instructors.</p> <p>Learners are removed from work environment so that they can focus on the course free from distractions.</p>	<p>Scheduling may not meet the needs of everyone who needs the information or instruction.</p> <p>Does not provide enough time to give everyone feedback they may need.</p> <p>Moves at one pace, or at the pace of the majority of the class, and does not account for individual rates and styles of learning.</p> <p>Lack of transfer to the workplace.</p> <p>Relies heavily on instructor knowledge.</p> <p>Inconsistent delivery and certain areas stressed or de-emphasized, causing gaps in learning and varied levels of learner involvement.</p> <p>Inconsistent evaluation.</p> <p>Involves travel time and expenses for participants to attend training at a centralized location or for instructor travel.</p> <p>Limits numbers that can participate at one time.</p>
Computer-based	<p>Consistent delivery.</p> <p>Accommodates individual time schedules.</p> <p>Extensive multi-sensory capabilities.</p> <p>Learner-controlled pace.</p> <p>High degree of interactivity and involvement by the learner.</p> <p>Adapts to learner performance.</p> <p>Consistent testing and record-keeping.</p>	<p>May be too text-based.</p> <p>Expensive due to the numbers of design team members required, authoring platform hardware and software, and cost of added media.</p> <p>Long design and development time, ranging from 250 to 750 design and development hours per hour of delivered instruction, depending on the complexity of the content. For a first project, even more time needs to be scheduled.</p> <p>Specialized computer skills are required of programmers and authors.</p>

<i>Media</i>	<i>Advantages</i>	<i>Limitations</i>
	<p>Unlimited opportunity for review.</p> <p>Over-learning through multiple presentations and examples of the same concept.</p>	<p>Content-/context-specific feedback may be limited.</p> <p>A poorly designed user interface makes navigation difficult (i.e., extensive menu layers) and/or interferes with learning (i.e., uses too many “bells and whistles”).</p>
Satellite broadcast	<p>Transcends geographical boundaries.</p> <p>High levels of interaction and immediate feedback to questions in spite of distance.</p> <p>One instructor for a large group of participants.</p> <p>Reduced travel for participants and instructors (reduced cost and greater convenience).</p> <p>Can train large numbers in a short period of time.</p> <p>Can incorporate a variety of media.</p> <p>Two-way video permits instructor to see participants and participants to see each other.</p>	<p>Large time zone differences require some to participate at inappropriate times.</p> <p>May be a “talking head” with little or no interaction, which becomes boring; participants lose interest.</p> <p>Special training of instructor to handle technology or large staff to handle broadcast equipment is often required.</p> <p>More preparation by instructor is needed to coordinate technology.</p> <p>Satellite time is very expensive.</p> <p>One-way video does not allow students and instructor to see each other.</p>
Video teleconferencing	<p>Less expensive than satellite broadcasting due to use of existing telephone lines.</p> <p>Transcends geographical boundaries.</p> <p>High levels of interaction and immediate feedback to questions in spite of distance.</p> <p>One instructor for a large group of participants.</p> <p>Reduced travel for participants and instructors.</p> <p>Can train large numbers in a short period of time.</p>	<p>Delays due to compression and decompression rates of video result in video and audio out of synchronization.</p> <p>Large time zone differences require some to view at inappropriate times.</p> <p>May be a “talking head” with little or no interaction, which becomes boring; participants lose interest.</p> <p>Special training of instructor to handle technology or large staff to handle broadcast equipment is often required.</p>

<i>Media</i>	<i>Advantages</i>	<i>Limitations</i>
	<p>Can incorporate a variety of media.</p> <p>Two-way video permits instructor to see participants and participants to see each other.</p>	<p>More preparation by instructor to coordinate technology.</p> <p>One-way video does not allow students and instructor to see each other.</p>
Web-based	<p>Can include “chat rooms” where participants and instructor can have dialogue or interactive, real-time, collaborative discussions.</p> <p>Can include electronic mailboxes where participants can pose questions to an instructor or participants.</p> <p>Can include reference and data-storage capabilities.</p> <p>Can include sharing of files and data.</p> <p>Course materials can incorporate audio, video, and graphics.</p> <p>Material is easily updated.</p>	<p>More preparation by instructor to coordinate and plan course elements.</p> <p>Specialized design skills of programmers and authors.</p> <p>Security, testing, and feedback may be limited.</p> <p>A poorly designed user interface is difficult to navigate (i.e., extensive menu layers) and/or interferes with learning (i.e., too many “bells and whistles”).</p> <p>Slow video compression and decompression rates cause video and audio to be out of synchronization.</p>
Audio tapes	<p>Flexible in its delivery; participants can get information anywhere there is a tape player.</p> <p>Inexpensive to develop and deliver.</p>	<p>Only one sensory modality used for learning.</p>
Video tapes	<p>Flexible in its delivery; participants can get information anywhere there is video playback equipment.</p> <p>Inexpensive to duplicate and deliver after initial development costs.</p> <p>Good for role-modeling behavior and motivation.</p>	<p>Only two sensory modalities used for learning.</p> <p>Expensive to produce due to highly specialized skills of videographers, editors, producers, and scriptwriters. Industry standards range from \$500 up to \$2,000 per finished minute of video.</p>

<i>Media</i>	<i>Advantages</i>	<i>Limitations</i>
Performance Support Systems/ Electronic Performance Support Systems (PSSs, EPSSs)	<p>Provides information on an as-needed basis.</p> <p>Does not require formalized training that removes people from their jobs.</p> <p>Best for providing information on procedures and processes or reference material.</p> <p>Ready source of infrequently-used or complex information.</p>	<p>Not good for delivering concepts, principles, or demonstrations.</p> <p>Specialized programming and authoring skills are required of members of design team for EPSSs.</p> <p>May have a user interface or be constructed in such a way that it is too complex to navigate.</p> <p>May not be organized in a way that allows users to quickly access the information they need.</p>
Audio teleconferencing	<p>Inexpensive to duplicate and deliver after initial development costs.</p> <p>Can include large numbers of participants.</p> <p>Technology is readily available.</p> <p>Transcends geographical boundaries.</p> <p>High levels of interaction and immediate feedback to questions in spite of distance.</p> <p>Requires only one facilitator for a large group of participants.</p> <p>No travel required.</p>	<p>Visual aids are not available.</p> <p>Large time zone differences require some to participate at inappropriate times.</p> <p>Lacks visual cues for gathering information.</p> <p>Scheduling may not meet the needs of everyone who needs the information or instruction.</p> <p>Only one sensory modality used for learning.</p>

Once the most appropriate media are determined, each medium must be associated with an objective. This match determines how each piece of information will be delivered. For example, the same business problem may involve a systemic communication issue that will be delivered using a satellite broadcast, a performance issue in providing equipment to employees so that they can get their jobs done, and training on the equipment.

COST

The feasibility of each medium must be judged against the potential benefit offset by the cost of the solution. This feasibility is calculated as a Cost-Benefit Ratio. In this equation, cost equals the anticipated benefit of the solution divided by the required investment. The Cost-Benefit Ratio formula is:

$$CB = \text{Anticipated Benefit of the Solution} \div \text{Cost of Analysis, Design, Development, Implementation, Maintenance}$$

The second element of cost is the Internal Rate of Return. When a project begins, resources immediately begin to be expended. The question is, how quickly can these costs be recouped so that there will be a profit? The Internal Rate of Return (IRR) formula is:

$$IRR = (\text{Anticipated Benefit of the Solution} \div \text{Cost of Analysis, Design, Development, Implementation, Maintenance}) \times \text{Time}$$

The Cost-Benefit Ratio and the Internal Rate of Return should be calculated before a project begins to determine if the project should be completed using the methodologies and media chosen.

The third element of cost is Return On Investment, which is calculated upon project completion to determine if the benefit was realized. The Return on Investment (ROI) formula is:

$$ROI = \text{Actual Benefit of the Solution} \div \text{Cost of Analysis, Design, Development, Implementation, Maintenance}$$

VALIDITY MEASURES

Studies have established the content and predictive validity of the media analysis tool. *Content validity* was developed by a group of ten highly qualified instructional designers who established the criteria for the instrument and attached media to these criteria based on the structure of the information that best fit them. The content of the instrument has been revised numerous times over the past five years based on feedback from users.

Participants in the Training Development Certificate program offered by the University of Oklahoma established the *predictive validity* of the tool over a five-year period. The program is offered in the spring and autumn of each year in four locations throughout the southwestern United States. The total number of classes included in the validity study was 40. Each class averaged 25 participants.

Predictive validity was established by providing four business issues to the participants in the program (n=250). Each issue was based on an actual project that had resulted in a solution that met a business need. Teams of five participants worked on each scenario. Ninety-five percent (95%) of the solutions arrived at by the teams were the same as the actual solution to the issue.

SUMMARY

The four components of the systematic approach described in this model will result in a business solution destined for success because the tool considers all aspects of an issue rather than narrowly focusing on one aspect. Different groups within an organization will differ in their focus. Upper management controls the systemic issues; middle management the performance issues; the training department the training issues. Many important factors will be overlooked if all three groups decide that training is the solution. A much greater proportion of the issue or problem will be handled if all three groups work together.

A systematic process uncovers and solves the true cause of the business issue rather than treating the symptom, which is what examining only one aspect does. As Gerry Rummler and Alan Brache state, "If you pit a good performer against a bad system, the system will win almost every time" (1999: 13).

REFERENCES

- Gagné, Robert. (1985). *Conditions of Learning and Theory of Instruction*. Austin, Texas: Holt, Rinehart & Winston.
- Gilbert, Tom. (1996). *Human Competence: Engineering Worthy Performance*. Washington, D.C.: ISPI Press.
- Hammer, M., and J. Champy (1994). *Reengineering the Corporation: A Manifesto for Business Revolution*. New York: Harper Business.
- Lee, William W. and, Robert A. Mamone (1995). *Computer Based Training Handbook: Assessment, Design, Development, Evaluation*. Englewood Cliffs, New Jersey: Educational Technology Publishers.
- Lee, William W. and Diana L. Owens (2000). *Multimedia-Based Instructional Design for Computer-Based Training, Web-Based Training, Distance Broadcast Training*. San Francisco: Jossey-Bass Publishers.
- Lee, William W. and Diana L. Owens (1999). “Linking Business Needs To Training Objectives and Delivery Media.” *Performance Improvement Journal*: 38(8), pp. 30-36.
- Merrill, M. David (1992). *Teaching Concepts: An Instructional Design Guide*. Englewood Cliffs, New Jersey: Educational Technology Publishers.
- Rummler, Gerry and Allen Brache (1999). *Improving Performance: Managing the White Space on the Organizational Chart*. San Francisco: Jossey-Bass/Pfeiffer.

BIOGRAPHIES

William W. (Bill) Lee is Director of Performance Technology at American Airlines Corporate FlagShip University in Fort Worth, Texas. Dr. Lee holds a Bachelor of Science degree in education from Clarion University of Pennsylvania, a Master's of Education degree from Penn State University, and a Ph.D. in Curriculum and Instruction from Penn State University. He has held positions in higher education at Penn State University, Clarion University of Pennsylvania, and Virginia State University. He is presently on the faculty of the University of Oklahoma and University of Texas at Dallas. Dr. Lee received the 1997 Distinguished Achievement award from the Dallas Chapter of the American Society of Training and Development (ASTD). He has been on the board of directors for the Dallas chapter of the ASTD, with which he has been affiliated since 1991. He is a contributing editor for the *Performance Improvement Quarterly Journal* of the International Society for Performance Improvement (ISPI). Dr. Lee is the lead author of *The Computer-Based Training Handbook: Assessment, Design, Development, and Evaluation* with co-author Robert A. Mamone and *Multimedia-Based instructional Design for Computer-Based Training, Web-Based Training, and Distance Broadcast Training* with co-author Diana L. Owens. He has published numerous articles in professional journals and has made presentations at many national and international conferences. He holds copyrights on training materials and instruments. His areas of specialization include testing and measurement, performance analysis, media analysis, business process improvement, and organizational and professional development.

Diana L. Owens is a senior consultant for Idea Integration, an e-business solutions provider of end-to-end solutions for clients seeking to define, design, implement, and manage Internet strategies across their enterprise. Idea Integration also specializes in technical communications and training by designing, developing, and delivering documentation and custom training for customers who wish to improve quality, reduce costs, or meet a demanding schedule. Ms.Owens has previously worked with EDS, Action Systems, Multimedia Learning, Inc., CAE Link, and the U.S. Airforce. She lives in Garland, Texas, a suburb of Dallas.