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About this issue...

This issue of JID contains articles dealing with cost-effectiveness in media selection, organizing course-level instruction, designing instruction for attitudinal outcomes, the future of ID, and a case study of ID in higher education. It also expands the Book Review department and adds a new Letters to the Editor department.

Freedman and Gruebel present a decision model for selecting media based on cost and benefit factors. They identify cost variables that should be considered, how to calculate those costs, the benefits that should be considered, how to assess these benefits, and the limitations of their model.

Reigeluth proposes the elaboration theory of instruction as an alternative to learning hierarchies in developing macro-level strategies for organizing instruction. He explains the need for the approach and the concepts and procedures involved in using it; he illustrates the procedures with examples.

Simonson proposes six guidelines for the design of instruction for attitudinal outcomes based on research. These guidelines can be applied by instructional developers to increase achievement of affective objectives.

Guzy, Gardiner, and Humphrey present a comprehensive case study of an ID project in higher education. The problem addressed, the parameters of the solution, the development process used, the costs involved, and the results of the project are detailed; in addition some general observations about an ID project are offered.

Boutwell continues the discussion about the future of ID. He addresses problems in the ID field missed by Silber and Gustafson (Volume 2, No. 1), which he sees as internal limitations of the ID process. Based on these problems, he proposes future directions for ID and training instructional developers.

The new Letters to the Editor department also addresses the question of the future of ID. One letter questions some of Gustafson's points, and Gustafson responds. This will be the format of the Letters department; readers are invited to respond to any article published in JID; the author will then be given the opportunity to respond to the letter.

This issue also contains the expanded format Book Review department, with two differing reviews of Gilbert's new book—one by a practitioner in industry and one by a practitioner in higher education.

Soon, JID will be beginning three new departments: reviews of instructional systems; abstracts of ongoing ID projects; and training modules in ID skills. Watch for them in the next two issues.
Cost-Effective Video: A Taxonomic Decision-Model for Media Selection

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The increased growth rate of video or nonbroadcast television use in business and industry (e.g., Brush & Brush, 1973; Barwick & Kranz, 1975; Cathcart, 1976; Brush & Brush, 1977; and Gruebel, 1979) has occurred, for the most part, without systematic analysis of costs and benefits and cost-effectiveness in the decisionmaking process. Barwick & Kranz (1975), for example, suggest that not all video decisions can be explained by rational processes; that video has some of the earmarks of a fad and part of its popularity can be attributed to its being the "in" thing. Brush & Brush (1977) found a new category of respondents in their most recent survey, former users who could not justify their video operation after several years of program production and distribution. Gruebel (1979) found that one insurance company is now a former user because they "bought some equipment which was completely out-of-date before we really found a use for it." Only 12.6 percent of the total user respondents to Gruebel's survey indicated they had a formalized cost analysis/cost-justification system, but it was questionable whether any of these organizations were actually measuring cost-effectiveness.

In view of a major investment of dollars in video, it would have been reasonable to assume that some kind of costs and benefits analysis would be performed prior to making the decision to purchase the video package. Lately, top management apparently has come to realize that communications—namely, television services—within an organization such as the business, be a managed function (e.g., Brush & Brush, 1977). To provide guidance in this direction, we have developed a decision-model for the potential user of video. In addition, present users also can ascertain with this decision-model whether or not they are using video cost-effectively.

Cost-Benefit Analysis

A cost-benefit analysis consists of examining the incremental costs of various alternatives (costs directly related to each alternative) and comparing these costs with the benefits derived from each alternative. The alternative with the highest net benefit (benefits minus incremental costs) represents the best choice. However, because many of the figures generated in this type of analysis are estimates, the potential user should be aware that alternatives with small differentials in net benefits are more or less equal choices.

Decision-Model

The decision-model has been developed in the format of a taxonomy (Figure 1). To select media, some systematic way must be found to compare costs and benefits. A taxonomy is a classification scheme. Previous taxonomies in biology and zoology, education, and accounting (e.g., Simpson, 1961; Bloom, 1956; and Freedman, 1975) were used to compare relationships and nonrelationships of phenomena just as the present taxonomy can be used to compare incremental costs and benefits of media alternatives.

Reviews of research on media selection and instructional design (e.g., Campbe, 1974; Allen, 1971) reach similar conclusions regarding the need for a taxonomic approach to the problem. Previous media taxonomies have been useful to such decisionmakers as engineers and media practitioners, teachers, instructional designers, and textbook illustrators (e.g., Breit, 1971; Gropper & Glasgow, 1971; Fleming, 1967; and Tosti & Ball, 1969). Clark (1975) constructed a taxonomy of media attributes for research purposes.

The taxonomy divides the decision-model into a number of components: (1) purpose(s) for using video; (2) alternative ways of achieving purpose(s); (3) cost variables for each alternative; (4) incremental costs for each alternative; (5) benefit variables for each alternative; (6) benefits of selecting a particular alternative; and (7) net benefits of each alternative.

Purpose

It is necessary to set well defined goals before the decision to purchase a video or alternative package. Media consultants agree on this point without exception. Brush & Brush (1977) advise that setting goals is always a good place to start. Barwick & Kranz (1975) described the mismanaged organization with undefined goals: "The organization blunders into video operations without knowing what it wants to achieve, or if video is the right tool to effect that achievement. In many cases, a film or filmstrip could do just as well with far less investment. Without defined goals, there is no rational basis for evaluation. The video operation becomes difficult to defend at budget time..." (p. 9).

Video has been used for a variety of purposes that can broadly be defined as educational. Television programs have been developed for proficiency upgrading, training and job skills, sales training, safety, sales meetings, and promotional/product demonstrations, management communications, employee orientation and news, management training and development, community and public relations, and the like. Regardless, the starting point of the decision-model is that the potential user...
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knows specifically the intended use(s) for the video or alternative package.

If video is to be used for one purpose only, then that purpose should be included in the decision-model. However, if video is to be used for several purposes, then each of the intended uses should be included in the decision-model and compared with the alternatives. Although the decision-model will be described with consideration to a single purpose (training), it can be used for multipurpose situations. Should other or additional purposes be considered, those purposes also must be included in the decision-model.

**Alternatives**

The second component of the decision-model consists of possible media alternatives for achieving the intended purpose(s). Examples provided in the taxonomy have the same alternatives regardless of purpose(s). This does not mean necessarily that these alternatives exist for every media decision. Rather, these alternatives exist for purposes included in the taxonomy.

Prior to the development of audiovisual and video technology, educational programs relied on some form of written communication (print) or face-to-face communications (live presentation). Either print or live presentation or print and live presentation still are alternatives.

A live presentation also may be delivered in conjunction with other media. Because the addition of other media changes both costs and benefits of the live presentation, each combination should be included as an alternative.
These other combinations include: live presentation with audiocassette, live presentation with slides, live presentation with audiocassette and slides, live presentation with filmstrips, live presentation with audiocassette and filmstrips, live presentation with video, and live presentation with film.

Live presentation refers to the presentation of educational material by a teacher (an expert in the field), or some other professional. When the presentation of educational material is in combination with other media but the person in charge of the media serves an auxiliary function, the presentation will be considered media-only.

Because educational material may be presented without face-to-face communication by an expert in the field, other alternatives include: audio-only, audiocassette and slides, audiocassette and filmstrips, video-only, and film-only.

Cost Variables

The cost variables for each alternative include annual costs of production-distribution-reception and service. These cost variables have been categorized regardless of cost type: that is, without considering whether these costs are fixed, variable, recurring, non-recurring, or joint (shared with other projects). Production-distribution-reception costs include: equipment (hardware, machine); programming (software, distribution, labor, and overhead). The costs of service provided by technical support staff (e.g., engineers) do not involve software, but include: hardware, distribution, labor, and overhead.

These cost variables are interrelated. For example, production-distribution-reception costs of hardware and the subsequent servicing costs of alignment and testing equipment depend on degree of sophistication or the desired program quality, location of the audience, size of creative and technical support staff, and the allocation of space for providing media services. In turn, these costs are related to time factors built onto each variable (e.g., amortization schedule for hardware).

Production-distribution-reception

The hardware cost variable for production-distribution-reception has three dimensions: (1) selection of medium; (2) technology specifications for achieving purpose(s); and (3) time factor. Not only may costs vary from one alternative medium to another, but within a selected medium. For example, 35mm film equipment is considerably more expensive than 16mm film equipment, which in turn is considerably more expensive than the Super-8 or 8mm format. Similarly, broadcast-quality color cameras are considerably more expensive than light-weight black & white porta-packs; audio consoles equipped for sound mixing cost considerably more than playback-only audio equipment; and so on. The medium selected should represent a balance between technical specifications necessary for achieving purpose(s) and available funding. Moreover, costs should include expenses for maintenance and repair and the manufacturers’ amortization schedule for hardware. Any tax effects of purchasing equipment (e.g., investment tax credit) should be deducted from production-distribution-reception costs.

Software costs should represent total, average, or specified annual costs of the completed program(s) for one or more receiver(s). The software cost variable has two dimensions: (1) product; and (2) time factor. The completed program or product may require certain expenses in production, distribution, labor, and overhead. These include: materials (e.g., costumes, props, set pieces), talent (e.g., “on-camera” performers, models), outside services (e.g., photographic laboratory processing and printing, film-to-tape or tape-to-film transfer, time-base correcting, video dubbing), and the like. The time factor, which should be consistent with that of other cost variables and figured on an annual basis, includes the number of completed programs, the length of time the product is expected to last (physically), the length of time the message is expected to last (before it is outdated), the number of times the product is expected to be used (access), the average size of the audience each time the product will be used, and the necessary length of time required to produce and update the product.

Distribution costs vary with the medium selected and location of the intended audience. Video can be wired, microwaved, or sent by satellite (some organizations “network” their programs to a variety of locations) provided there are reception capabilities at designated locations. Film can be projected at a central location, which would require the intended audience to travel, or it can be projected at multiple locations, provided there are at least as many projectors and program duplicates as locations. Regardless, the costs for viewing/listening (e.g., projectors, screens, video receivers/monitors) and program duplicates (e.g., film prints, videocassette dubs) should be figured into this cost variable. Travel requirements during the specified time period also should be figured into the cost of distribution. This includes the cost of distributing presenters to multiple locations of the intended audience, the cost of bringing the intended audience to a central location for viewing/listening, and cost of trainee’s travel or loss of productivity while attending the program. Such overhead as running costs (e.g., electricity, telephone charges, videocassette, and film stock) should not be figured into distribution costs.

The costs of labor include: full-time media staff (e.g., producers, directors, camera operators, production assistants), part-time devoted to media services by other corporate staff (e.g., artists, managers, supervisors), and freelance personnel (e.g., “on-camera” talent, artists, graphic designers, writers, outside producers). Normal employee benefits should be included in the costs for all full-time media staff.

Overhead costs include space allocation and development, in addition to the various running costs of production-distribution-reception (e.g., tape stock—audio and video, film stock—still prints and slides and motion pictures, headphones, electricity, telephone charges, materials).

Service. The hardware cost variable for engineering service has two dimensions: (1) technology specifications and (2) time factor. The technology specifications for service are dictated by the technology specifications for production-distribution-reception. Costs should include expenses for maintenance and repair (or “back-up” servicing equipment) and the manufacturers’

“To select media, some systematic way must be found to compare costs and benefits.”

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amortization schedule for hardware. Any tax effects of purchasing equipment should be deducted from service costs. Service alignment and test equipment necessary for AV/video operations might include: time-base correctors (TBCs), oscilloscopes, digital circuitry. Like distribution costs for production-distribution-reception, distribution costs for engineering service vary with the medium selected and location of the intended audience. Regardless, the costs for maintenance of viewing/listening equipment (other than hardware, labor, and overhead) should be figured into this cost variable. If engineers (or other technical staff hired for the purpose of servicing production-distribution-reception hardware) are required to travel during the specified period under study, these costs also should be figured into distribution costs.

The costs of labor include that of all technical staff hired for the purpose of servicing production-distribution-reception hardware, whether employment is full-time for the media operations, part-time, or on a free-lance or consulting basis. Normal employee benefits should be included in the costs for all full-time technical staff for the media operations. Overhead costs include space allocation and development, in addition to a variety of running costs (e.g., spare parts, audio and video cables, extension cords, workbench tools).

Incremental Costs

Incremental costs are those costs directly related to the particular alternative. Costs that remain constant regardless of alternative are not relevant to the decision. Thus, for example, the depreciation cost of the office building that serves as corporate headquarters or executive salaries that remain the same regardless of the medium selected are not relevant costs.

Incremental costs can be readily ascertained after all cost variables for each alternative have been determined and computed. In doing so, however, these annual incremental costs should be compared during a specified time period or finite number of years (i.e., based on either the predicted life of the mediatised program, the manufacturers' amortization schedule for production-distribution-reception hardware, or some arbitrary number of years for study). Then, discount these annual incremental costs back to the present at the cost of capital or interest rate, so that all incremental costs are at the present value.

Benefit Variables

The benefit of media selection would be cost-effective message(s) that the receiver(s) can understand and act upon as desired by the organization (minimum standards of performance need to be determined). There are a number of important benefit variables in determining whether or not the message(s) would be cost-effective. These include: types of messages/objects; the benefit or dollar value of the increase in productivity for one receiver performing a task or series of tasks at some minimum standard of performance, or realizing objectives in some other predetermined way; audience size (the number of receivers of the messages); the percentage of those receivers performing the tasks or realizing objectives; and the percentage of tasks performed or objectives realized.

"Video, in particular, represents a major investment of dollars and must be a `managed' function within an organization."

The type of message component includes objectives so that systematic evaluation of performance can be made. Messages may have any one or more of a variety of purposes (see Figure 1) and may deal with such elements as technical information, abstract concepts, emotions (e.g., conflict management), rote memorization, or any combination of these elements. Different message types and elements may require different methods of evaluating performance.

The benefit of one receiver performing a task or series of tasks at some minimum standard of performance, or realizing objectives in some other predetermined way, is the dollar value of the increase in productivity. For some larger corporations, this data is already available.

The audience size involves the known or estimated number of receivers of the messages during a specified time period.

The percentage of those receivers performing the task(s) or realizing objectives is equal to the number of those receivers performing the task(s) divided by the number of receivers of the message(s).

The percentage of tasks performed is equal to the number of tasks performed divided by the number of tasks that the organization would like the intended receivers to perform after viewing/listening to the messages.

Benefits

Measuring the benefits of each alternative is perhaps the most difficult part of this and any cost-benefit analysis. Benefits may have to be determined ex ante or ex post, depending on whether the organization is considering the purchase of a media package for future use or evaluating an existing package for cost-effectiveness. Ex ante determination of benefits would be appropriate for the former, ex post evaluation for the latter.

Ex ante, measure benefits by determining the worth or dollar value of the increase in productivity for one receiver performing a task or series of tasks at minimum standards of performance and multiply that figure by the number of receivers who have viewed/listened to the same or similar messages using another medium (i.e., dollar value, 1 employee trained × audience size). Then multiply that figure by the percentage of those receivers who performed the task and again, by the percentage of the task(s) performed (i.e., dollar value, 1 employee trained × audience size × % of employees trained × % of task(s) performed).

Compare this result with that of multiplying the worth of one receiver performing a task or series of tasks at minimum standards of performance by the number of receivers who will view/listen to the same or similar message(s) using the media package being considered for purchase; then, further multiplying that figure by the estimated percentage of those receivers who will be able to perform the task(s), and again, by the estimated percentage of the task to be performed.

Because the percentage of receivers performing tasks at minimum standards of performance and percentage of the task performed are based on estimates, these percentages should be presented as ranges (e.g., 75 percent - 85 percent). The resulting benefit also should be presented as a range.
Hypothetical Example of \textit{ex ante} Approach

Company A currently uses a live presentation with slides to train its employees, but the company is considering the purchase of a video package to replace this method of training. Company A must first determine the effectiveness of live presentation with slides.

There are 100 employees involved in Company A's training program. Company A makes the following determinations regarding effectiveness:

- 20\% of employees trained at effectiveness level of 90 \& 100\% 
- 50\% of employees trained at effectiveness level of 70 \& 80\% 
- 20\% of employees trained at effectiveness level of 40 \& 60\% 
- 10\% of employees trained at effectiveness level of 10 \& 35\%

Company A also determines that the value of an effectively trained employee is $10,000 for each of the next five years. The cost of capital (interest rate) is 10\%. Therefore, the range of benefits can be determined as follows:

\[
\begin{align*}
20\% \times 90 - 100\% \times 100 \text{ employees} \times $10,000 &= $180,000 \text{ to } $200,000 \\
50\% \times 70 - 80\% \times 100 \text{ employees} \times $10,000 &= $350,000 \text{ to } $400,000 \\
20\% \times 40 - 60\% \times 100 \text{ employees} \times $10,000 &= $80,000 \text{ to } $120,000 \\
10\% \times 10 - 35\% \times 100 \text{ employees} \times $10,000 &= $10,000 \text{ to } $35,000
\end{align*}
\]

Range of Benefits = $620,000 to $755,000

Company A must then determine the present value of the range of benefits since benefits accrue to the company for the five years. Assuming that benefits are received during the five-year period, the present value of the range of benefits is determined as follows:

\[
\begin{align*}
$620,000 \times 3.7908 \text{ (present value of annuity at cost of capital for five years)} &= $2,350,296 \\
$755,000 \times 3.7908 \text{ (present value of annuity at cost of capital for five years)} &= $2,862,054
\end{align*}
\]

Present Value of Range of Benefits = $2,350,296 to $2,862,054

The resulting range of benefits then can be compared to the incremental costs of a live presentation with slides; the difference between the benefits and incremental costs is the net benefit or net loss.

Company A must then determine \textit{ex ante} the net benefit of video. The determination can be compared with the net benefit of live presentation with slides; the alternative with the highest net benefit represents the better choice. However, determination of the best choice requires that all other media alternatives for achieving purposes be compared for benefits. It may be possible to obtain benefit determinations from other organizations in the same or related industry that use media alternatives (e.g., audiotape with slides).

\textbf{Ex post measure benefits in the same way as \textit{ex ante} and compare benefits for each media alternative, except that determination of effectiveness is based on actual past performance or observation of present on-the-job performance. While estimates would not have to be made regarding the percentage of those performing the task(s) at minimum standards of performance and the percentage of the task(s) performed, observation itself reflects an estimate (although such an estimate stands to be more precise than that of \textit{ex ante} methods). Therefore, \textit{ex post} findings also should be presented as a range.}

In \textit{ex ante} and \textit{ex post} measurements of benefits, find the benefits for each year based on the dollar value of the increase in productivity (either estimated based on the probability assumption that the benefit is equal to increase in productivity or based on past data). Determine the benefits for the same finite number of years used in determining incremental costs and discount benefits using the same cost of capital or interest rate.

\textbf{Net Benefits}

The net benefit of media package is determined by subtracting incremental costs from the benefits. However, because the benefits should be presented as a range, the resulting net benefit also should be expressed as a range.

The next step would be to compare incremental costs and benefits for each media alternative; the medium with the largest net benefit should be selected. The resulting ranges provide useful comparative, although not precise, measurement for users and potential users to analyze and select media packages in the decisionmaking process. Alternatives with small differentials, or any overlap, in net benefits would indicate more or less equal choices.

\textbf{Discussion}

The decision-model has been developed in the format of a taxonomy so that costs and benefits can be systematically compared. However, the potential and present video user should be aware that each component of the decision-model contains varying degrees of uncertainty.

In the first component, for example, the varied purposes for using video present problems in the measurement of benefit variables (e.g., performance of task, dollar value of the increase in productivity for one receiver realizing objectives in some predetermined way). The problems differ in magnitude for each purpose. Thus, it would be easier to measure benefit variables for a training program (measuring the performance of specific tasks) than such other video messages as employee orientation and news, community and public relations, and management communications (measuring attitudes, image, and style).

Determining alternative ways of achieving purposes is limited by the inability to pair media with message types; that is, selecting the medium most suitable for conveying the message. Previous research is inconclusive (e.g., Anderson, 1972) and intuition of media specialists may not be accurate.

The cost variables component is subjected to uncertainty created by changing prices and unavailable information necessary for production-distribution-reception and service decisions. For example, manufacturers' suggested prices and specifications do not include some of the information necessary in deciding to purchase the products of one manufacturer or the other (e.g., manufacturers claim life expectancy of videotape depends partly on storage conditions but do not specify temperatures and humidity, each manufacturer has its
Video, in particular, represents a major investment of dollars and must be a "managed" function within the organization. The decision-model has been developed in the format of a taxonomy to provide guidance in the direction for potential and present users of video, although it can be used in the selection of various alternative media packages.

The starting point is setting well-defined goals. Other components of the decision-model—cost variables, incremental costs, benefit variables, ex ante or ex post benefits, and net benefits—then can be determined. The net benefits represent benefits minus incremental costs and should be expressed as a range.

Because each component contains varying degrees of uncertainty, the decision-model should be viewed as nothing more than a guide.

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In Search of a Better Way to Organize Instruction: The Elaboration Theory

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The elaboration theory of instruction is an alternative to the standard way of organizing instruction based on a hierarchical task analysis. The hierarchical organization results in an instructional sequence that begins with highly fragmented, small pieces of the subject-matter content. Many educators have found its fragmentation to be demotivating. Many educational psychologists have found its parts-to-whole sequence to be inconsistent with much knowledge about how learning occurs most effectively—namely schema theory and its predecessor, subsumption theory. And many instructional designers have found that “learning hierarchies” represent a very incomplete basis upon which to make decisions about sequencing the instruction, primarily because learning hierarchies are only one aspect of the structure of subject-matter content. All this is not to deny that learning prerequisites exist nor to say that they are not important—they do exist and they are important. Rather this affirms that learning prerequisites are not a sufficient basis for organizing a whole course: our knowledge must progress beyond the hierarchy. It is for these reasons that the elaboration theory is being developed.

Context

Before describing the elaboration theory, I would like to place it within the context of instructional design in general. Instructional design theory can be thought of as being concerned with four major aspects of instruction (see Figure 1): (1) ways of organizing instruction, which include such concerns as sequencing and formatting the subject-matter content, (2) ways of delivering instruction, which is usually a matter of media selection, (3) ways of motivating students, which may be intrinsic or extrinsic, and (4) ways of managing the student’s use of the other three aspects of instruction (Reigeluth & Merrill, 1979).

As Figure 1 indicates, it is helpful to think of ways of organizing instruction as being of two types, based on their scope. Micro strategies are ways of organizing instruction on a single topic, such as on a single concept or on a single principle. They include such strategy components as generalities (or definitions), instances (or examples), and practice. Macro strategies are ways of organizing those aspects of instruction which relate to more than one topic, such as sequencing the topics, showing interrelationships among the topics, and previewing or reviewing the topics. Task analysis is done primarily, if not exclusively, to develop this last type of strategy—specifically sequencing strategy.

The elaboration theory of instruction is a partial theory of instruction—it does not deal with all aspects of instruction. As is shown in Figure 1, it deals primarily with macro strategies for organizing instruction; but it also includes many motivational strategies, and the other aspects of instruction will be integrated with elaboration theory in the foreseeable future. Merrill has done excellent work on micro strategies for organizing instruction (Merrill, Reigeluth, & Faust, 1979; Merrill, Richards, Schmidt, & Wood, 1977), and Keller (1979) and Dodge (1979) are making some excellent progress in the development of a motivational theory of instructional design.

The Elaboration Theory

The elaboration theory of instruction states that if cognitive instruction is organized in a certain specified way, then that instruction will result in higher levels of learning, synthesis, retention, and affect. There is a limitation to this theory: the smaller the amount of interrelated subject-matter content, the less difference it will make. With a small enough number of topics, it doesn’t make any difference how you sequence them, whether you show interrelationships among them, or whether you preview and review the topics (as long as there are no learning prerequisite relationships among them). The following is a description of that “certain specified way” of organizing instruction, which is called the elaboration model of instruction.

The Elaboration Model

A good introduction to the nature of the elaboration model of instruction is an analogy with a zoom lens. Taking a look at a subject matter “through” the elaboration model is similar in many respects to looking at a picture through a zoom lens on a movie camera. A person starts with a wide-angle view, which allows one to see the major parts of the picture and the major relationships among those parts (e.g., the composition or balance of the picture), but without any detail. The person then zooms in on a part of the picture. Assume that, instead of
Figure 1. The context of the elaboration theory in relation to other aspects of instructional design theory.

being continuous, the zoom operates in steps or discrete levels. Zooming in on a level on a given part of the picture allows the person to see the major subparts. After having studied those subparts and their interrelationships, the person could then zoom back out to the wide-angle view to review the other parts of the whole picture and to review the context of this part within the whole picture.

The person continues this pattern of zooming in one level to see the major subparts of a part and zooming back out for context and review, until the whole picture has been seen at the first level of detail. Then the person can follow the same zoom-in/zoom-out pattern for the second level of detail, the third level, and so on, until the desired level of detail is reached.

In a similar way the elaboration model of instruction starts the student with an overview of the major parts of the subject matter. It elaborates on one of those parts to a certain level of detail (called the first level of elaboration), it reviews the overview and shows the context of that part within the overview (an expanded overview), it continues this pattern of elaboration/expanded overview for each part of the overview until all parts have been elaborated on, and it follows the same pattern for further levels of elaboration. Of course, it must be remembered that the zoom-lens analogy is just an analogy and therefore it has nonanalogous aspects. One such dissimilarity is that all the detail of the picture is actually present (although usually not noticed) in the wide-angle view, whereas the detail is not there at all in the overview of the subject matter.

Now, some people ask, "don't you have to go through a lot of learning prerequisites to teach the overview?" The answer is a definite "no." In fact few unmastered learning prerequisites (if any) exist at the level of the overview. As a learner works to deeper levels of detail, increasingly complex prerequisites will need to be introduced. But if they are introduced only at the level of detail at which they are necessary, there will be only a few prerequisites at each level; and the learner will want to learn those prerequisites because he or she will see their importance for learning at the level of detail that now interests him or her.

The general-to-detailed organization prescribed by the elaboration model helps to ensure that the learner is always aware of the context and importance of the different topics that are being taught. It allows the learner to learn at the level of detail that is most appropriate and meaningful to him or her at any given state in the development of one's knowledge. And the learner never has to struggle through a series of learning prerequisites that are too deep a level of detail to be interesting or meaningful at the initial stages of instruction.

Unfortunately, the zoom-lens approach has not been used much in instruction, in spite of its fundamental simplicity and intuitive rationale. Many textbooks begin with the "lens" zoomed in to the level of detail deemed appropriate for the intended student population, and they proceed—with the "lens" locked on that level of detail—to pan across the entire subject matter. This has had unfortunate consequences for synthesis, retention, and motivation. Many instructional developers begin with the lens zoomed all the way in and proceed in a highly fragmented manner to pan across a small part and zoom out a bit on that part, pan across another small part and zoom out a bit on it, and so on until the whole scene has been covered and to some limited degree integrated. This has also had unfortunate consequences for synthesis, retention, and motivation. And some educators have intuitively groped for an elaboration-type approach with no guidelines on how to do it. This has resulted in a good deal less effectiveness than is possible for maximizing synthesis, retention, and motivation.

The major reason for the lack of utilization of the zoom-lens approach in instruction is probably that the hierarchical approach was well-articulated and was a natural outgrowth of a strong behavioral orientation in educational psychology. This in effect put "blinders" on most of the few people who were working on instructional design strategies and methodology.

To summarize, the elaboration model of instruction starts by presenting knowledge at a very general or simplified level—in the form of a special kind of overview. Then it proceeds to add detail or complexity in "layers" across the entire breadth of the content of the course (or curriculum), one layer at a time, until the desired level of detail or complexity is reached. It is important to emphasize, though, that the elaboration model describes a special kind of overview, and it prescribes a special way in which the elaboration is to occur. The following is as close as we can come (without sacrificing clarity) to a non-technical introduction to these special aspects of the elaboration model.

The Epitome

We do not like to use the word "overview" because its meaning is very vague—it means different things to different people. Also, we believe that a certain specific kind of overview is superior to other kinds. Among other
things, our overview must epitomize the subject matter that is to be taught, rather than summarizing it. Hence, we have named it the epitome. An epitome has two "critical characteristics" that distinguish it from other types of overviews: (1) it epitomizes the subject matter of the course (or curriculum) rather than summarizing it, and (2) it has a single "orientation"—which means that it emphasizes a single type of content.

With respect to epitomizing the subject matter of the course (or curriculum), an epitome is formed by "boiling down" the course content to its essence. It does not preview all of the course content; rather it presents a few fundamental topics that convey the essence of the entire content. Those topics are chosen or derived in such a way that all the remaining course content provides more detail or more complex knowledge about the epitome. Although an epitome is very general, it is not purely abstract. Since "general" and "abstract" are often confused, this distinction will be discussed in greater detail shortly.

With respect to having an orientation, the epitome emphasizes any one of three types of content: concepts, procedures, or principles. A concept is a set of objects, events, or ideas that have certain characteristics in common. Knowing a concept entails being able to identify, recognize, classify, or describe what something is. A procedure is a set of actions that are intended to achieve an end. It is often referred to as a skill, a technique, or a method. Knowing a procedure entails knowing how to do something. A principle is a change relationship—it indicates the relationship between a change in one thing and a change in something else. It describes causes or effects by identifying what will happen as a result of a given change (the effect) or why something happens (the cause). These three different emphases are referred to respectively as a conceptual orientation, a procedural orientation, and a theoretical orientation; and the orientation is selected on the basis of the general goals or purpose of the course (or curriculum). All three types of content may appear in the epitome, but one type receives primary emphasis; and the epitome is formed by epitomizing the orientation type of content, and then introducing whatever of the other two types of content are highly relevant. More will be said about this below.

I mentioned above that an epitome is very general but is not purely abstract. The terms "general" and "abstract" are often confused. It is helpful to think of three continua: (1) general to detailed, (2) simple to complex, and (3) abstract to concrete. These three continua are illustrated in Figure 2. The first two are very similar to each other, but the third is very different.

The general-to-detailed continuum refers primarily to a continuum formed by subdividing things (concepts or procedures) or by lumping things (concepts or subprocedures) together. "General" has breadth (things lumped together), while "detailed" is usually narrow (subdivisions). In Figure 2(a) "polar bear" is a more detailed concept than "animal." The simple-to-complex continuum refers primarily to a continuum formed by adding or removing things (principles or procedures). "Simple" has few things, while "complex" has many things. In Figure 2(b), the procedure for subtracting multidigit numbers is more complex than the procedure for subtracting single-digit numbers. Additional complexity can be added by introducing subprocedures for "borrowing" when the top number is smaller than the bottom number. The abstract-to-concrete continuum refers to tangi-

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**Figure 2. Illustrations of three continua that are often confused.**
bility, and there are two major types of tangibility. First, generalities are abstract, and instances are usually concrete—the definition of a tree is abstract, while a specific tree (an object) is concrete. This is the most important abstract-to-concrete continuum for instructional theory. Second, some concepts are considered abstract because their instances are not tangible. "Intelligence" is a good example of an abstract concept. This second abstract-to-concrete continuum is largely irrelevant for our purposes.

On the basis of these distinctions, an epitome is always either very general or very simple—it must be, to epitomize the instructional content. But it should never be purely abstract. According to Merrill's Component Display Theory (Merrill, Reigeluth, & Faust, 1979) it should contain the following for each topic it presents: a generality (e.g., the definition of a concept), some instances of that generality (e.g., examples of the concept), and some practice for the student in applying the generality to new instances. As a rough guide, an epitome usually contains about six (plus or minus three) topics—that is, about six different generalities, along with some instances and practice items for each. These topics may be any combination of concepts, procedures, and/or principles. Figures 3 and 4 illustrate the nature of each of the three kinds of epitomes: conceptual, theoretical, and procedural.

A Level-1 Elaboration

A level-1 elaboration is a part of the instruction that provides some more detailed or complex knowledge on an aspect of the epitome. It should not include all of the more detailed or complex knowledge on that aspect. Rather, a level-1 elaboration should itself be an epitome of all of the more detailed or complex knowledge on that aspect, just as zooming in one level provides a slightly more detailed wide-angle view of one part of the whole picture. There is usually a level-1 elaboration for each aspect of the epitome, but an aspect is not the same thing as a topic. It is possible that a level-1 elaboration may elaborate to some extent on all of the topics in the epitome or perhaps even on a relationship among those topics.

The depth to which a level-1 elaboration could extend is illustrated in Figure 3. The instructional content for the theoretical epitome includes the law of supply and demand, the principle of what causes changes to occur in the quantity supplied and the quantity demanded (price changes), the principle of why prices change in a free market economy, the concept of supply, supply schedule, and supply curve, the concept of demand, demand schedule, and demand curve, the concept of changes in quantity supplied or demanded, the concept of changes in supply schedules or demand schedules, and the concept of equilibrium price. Practically all principles of economics can be viewed as elaborations on the law of supply and demand, including those that relate to monopoly, regulation, price fixing, and planned economies.

Figure 3. The instructional contents for a theoretical epitome and for a conceptual epitome for an introductory course in economics.

Theoretical Epitome

1. The law (principle) of supply and demand.
   a. The principle of what causes changes to occur in the quantity demanded and the quantity supplied (price changes).
   b. The principle of why prices change in a free market economy.
2. The principle of why changes occur in supply schedules or demand schedules.
3. The concepts of supply, supply schedule, and supply curve.
4. The concepts of demand, demand schedule, and demand curve.
5. The concept of changes in quantity supplied or demanded.
6. The concept of changes in supply schedules or demand schedules.
7. The concept of equilibrium price.

Conceptual Epitome

1. Definition of economics
2. Definitions of subdivisions of economics:
   a. Definition of macro economics
   b. Definition of micro economics
   c. Definition of comparative economics
   d. Definition of international economics
   e. Definition of labor economics
   f. Definition of managerial economics.

Practically all concepts in economics can be viewed as elaborations on these concepts (i.e., as further subdivisions—either parts or kinds—of these concepts).

A Level-2 Elaboration

A level-2 elaboration is a part of the instruction that provides some more detailed or complex knowledge on an aspect of the epitome that is further elaborated in a level-1 elaboration. It should not include all of the more detailed or complex knowledge on that aspect. Rather, a level-2 elaboration should itself be an epitome of all of the more detailed or complex knowledge on that aspect, just as zooming in one level provides a slightly more detailed wide-angle view of one part of the whole picture. There is usually a level-2 elaboration for each aspect of the epitome, but an aspect is not the same thing as a topic. It is possible that a level-2 elaboration may elaborate to some extent on all of the topics in the epitome or perhaps even on a relationship among those topics.

The depth to which a level-2 elaboration could extend is illustrated in Figure 4. The instructional content for a procedural epitome for an introductory course in literature includes the identification of elements of the dramatic framework—character and plot. Combining the elements into composites appropriate for analysis of their literal meaning—analysis of character in terms of plot. Figuratively interpreting the elements—symbolism through character, mood, tone.

Making a judgment of worth—personal relevance, universality.

(This procedure is simplified by introducing only two elements for the analyses in a and b, three in c, and two in d. It is further simplified by introducing only those procedures and concepts necessary for the analysis and interpretation of a short poem. Complexity is added later by increasing the number of elements used in each stage of analysis or interpretation and by introducing procedures and concepts needed for analyzing and interpreting more complicated types of creative literature.)

2. Concepts necessary for performing the procedure in 1.
   a. Character
   b. Plot
   c. Symbolism
   d. Mood
   e. Tone
   f. Universality

Figure 4. The instructional content for a procedural epitome for an introductory course in literature. (I appreciate the help of Faith Stein in the preparation of this figure.)
tion should elaborate on an aspect of the epitome is somewhat variable (i.e., the discrete levels on the zoom lens are variable, not always constant and equal in the amount of detail added). The most important factor for deciding on the depth of a given level-1 elaboration is student learning load. It is important that the student learning load be neither too large nor too small, for either will impede the instruction's efficiency, effectiveness (especially for retention), and appeal. The number of topics that represent the optimal student learning load will vary with such factors as student ability, the complexity of the subject-matter topics, and student pre-familiarity with the topics. The breadth of a level-1 elaboration will usually be fairly difficult to adjust. Hence optimizing the student learning load in a given elaboration can often be done mainly by varying the depth of that elaboration.

Figure 5 illustrates the nature of a level-1 elaboration on the theoretical epitome in Figure 3, and Figure 6 illustrates the nature of a level-1 elaboration on the procedural epitome in Figure 4.

Other Elaborations

A level-2 elaboration is identical to a level-1 elaboration except that it elaborates on an aspect of a level-1 elaboration rather than on an aspect of the epitome. In a similar manner, a level-3 elaboration provides more detail or complexity on an aspect of a level-2 elaboration, and so on for elaborations at deeper levels of detail/complexity. In all cases, an elaboration at one level of detail/complexity should be an epitome for all the lower level elaborations that elaborate on it.

According to this kind of organization, elaborations that are on the same level are very different from each other with respect to the instructional content they contain (i.e., their topics are very different from each other); but elaborations that are on different levels are very similar to each other with respect to their instructional content (i.e., their topics are very similar), because each level has the same content as the previous levels, only at a level of greater detail/complexity. This provides an important systematic review mechanism—more will be said about this shortly.

1. Principle of increasing marginal costs as an explanation for the shape of the supply curve.
2. Principle of profit maximization for individual firms.
3. Procedure of marginal analysis to arrive at profit maximization.
4. Concepts of fixed and variable costs.
5. Concepts of total, average, and marginal costs.
6. Concepts of break-even point and shut-down point.

Figure 5. The instructional content for a level-1 elaboration on the theoretical epitome in Figure 3. This level-1 elaboration elaborates on the supply aspect of the law of supply and demand by presenting more complex principles that relate to supply.

1. How to identify other elements of the dramatic framework—setting, perspective, and language.
2. How to combine the elements into composites appropriate for analysis of their literal meaning—(1) analysis of character, plot, and setting, (2) analysis of perspective, character, and plot, and (3) analysis of language.
3. Concepts of setting, perspective, and language.
5. Procedure for analyzing imagery.
6. Concept of prosody.
7. Procedure for analyzing prosody.

Figure 6. The instructional content for a level-1 elaboration on the procedural epitome in Figure 4. This level-1 elaboration elaborates just on stages a and b—which must be elaborated at the same time because of their interrelatedness. It elaborates on these two stages by adding elements that need to be identified (in stage a of Figure 4) and analyzed in combination (in stage b of Figure 4). (I appreciate the help of Faith Stein in the preparation of this figure.)

Expanded Epitome

After each elaboration, the instruction presents a summarizer and an expanded epitome, equivalent to the zoom-out-for-context-and-review activity in the zoom-lens analogy. The summarizer is comprised of a concise generality for each topic presented in the elaboration. The expanded epitome does two things. (1) It synthesizes the topics presented within the elaboration (internal synthesis) and (2) it shows the relationship of those topics (and relationships) to the rest of the topics (and relationships) that have been taught (external synthesis).

Summary of the Elaboration Model

In summary, the elaboration model is as follows (see Figure 7). First, the epitome is presented to the student. Then a level-1 elaboration is presented to provide more detail on an aspect of the orientation content in the epitome (that aspect which is most important or contributes most to an understanding of the whole orientation structure). Next a summarizer and an expanded epitome are presented. Another level-1 elaboration and its summarizer and expanded epitome are presented. This pattern of level-1 elaboration followed by its summarizer and expanded epitome continues until all aspects of the orientation content that were presented in the epitome have been elaborated one level. Then a level-2 elaboration is presented to provide more detail on an aspect of the orientation content that was presented in one of the level-1 elaborations. As always, this elaboration is followed by a summarizer and an expanded epitome. This pattern continues until all of the aspects of the orientation content presented in all of the level-2 elaborations have been elaborated one
Figure 7. A diagramatic representation of the elaboration model of instruction.

level (unless the objectives of the course or the nature of the subject matter exempt a level-1 elaboration from being further elaborated). Additional levels of elaboration are provided in the same manner—an elaboration followed by a summarizer and an expanded epitome—until the level of detail/complexity specified by the objectives is attained in all aspects of the orientation content of the course.

It should be noted that there are three ways in which systematic review takes place. First, each level of elaboration covers content similar to that in the previous level (only with some additional detail and related topics). Learning this more detailed version of the same content stimulates or incorporates review of that earlier part of the course content. Second, the summarizer at the end of each elaboration reviews the content that was just presented in that elaboration. It does this by providing a concise generality for each topic. And third, the expanded epitome at the end of each elaboration constantly reviews the major content that was presented in earlier elaborations.

Using the Elaboration Model

We have developed a fairly detailed set of procedures for designing instruction according to the elaboration model (Reigeluth, Merrill, Wilson & Spiller, 1978). A major part of those procedures is analyzing the instructional content as to four different types of subject-matter structures. A subject-matter structure is something which shows a single kind of relationship that exists within a subject matter. Figure 2(a) shows part of a subject-matter structure. The four different types of subject-matter structures are: conceptual, procedural, theoretical, and learning structures. (Learning structures show learning prerequisite relations within the subject matter.) It is beyond the scope of this paper to describe and illustrate each of these four types of structures. The interested reader is referred to Reigeluth, Merrill, & Bando, 1978.

There are six major steps for designing instruction according to the elaboration model (see Figure 8). First, one must select an orientation—either conceptual, procedural, or theoretical—on the basis of the goals or purpose of the instruction. Second, one must develop an orientation structure for that orientation. It depicts the orientation content (either concepts, procedures, or principles) in the most detailed/complex version that the student needs to learn. This is a form of content analysis or task description. Then the orientation structure is analyzed in a systematic manner to determine which aspect(s) of the orientation content will be presented in the epitome and which aspects will be presented in each level of elaboration. In this way the “skeleton” of the instruction is developed on the basis of epitomizing and elaborating on a single type of content.

The fourth major step is to embellish the “skeleton” by adding the other two types of content at the lowest appropriate levels of detail. This is usually done by “nesting” the remaining subject-matter structures within different parts of the skeleton. Learning prerequisites are one of the considerations that enter in at this point.

Having allocated all of the instructional content to the different levels of elaboration, it is now important to establish the scope and depth of each individual elaboration that will comprise each level. The scope is usually predetermined by the orientation topic and its necessary supporting topics. The depth is then determined on the basis of achieving an optimal student learning load, as described above.

Sixth and finally, some of the internal structure of each elaboration within each level can be planned. The sequence of topics within an elaboration is decided on the basis of contribution to an understanding of the whole orientation structure (but of course within the constraints of learning prerequisites).
and the locations of synthesizers and summarizers are also determined.

This concludes the "macro" design process, at which point the "micro" design process begins—decisions as to how to organize the instruction on a single topic. We have spelled out these procedures for designing instruction in much greater detail elsewhere (Reigeluth, Merrill, Wilson, & Spiller, 1978).

The Need for Research

The model and procedures as described above have undergone very limited field testing and virtually no research. It may turn out that having a complete expanded epitome after every single elaboration is inefficient and unnecessary (especially after lower-level elaborations). It may also turn out that it is unnecessary for a student to study all level-1 elaborations before proceeding to a level-2 elaboration. This would have important implications for learner-controlled selection and sequencing of topics—a student could now truly follow his or her interests in approaching a subject matter. This would be particularly valuable in adult and continuing education contexts.

It is also likely that a large, full-scale field test of the design procedures will reveal more effective and efficient ways to design instruction according to the model.

The elaboration model as developed to date is a tentative move in a much-needed direction. It does not yet have the maturity and validation of the currently used approaches to instructional design, but the need for alternatives should be clear. And there is great potential for the elaboration model to meet that need.

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Designing Instruction for Attitudinal Outcomes

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As early as 1931 Thurstone was able to demonstrate the impact of film on the attitudes of children. In this landmark study it was found that two films depicting the Chinese either favorably or unfavorably were capable of producing attitude changes in either a positive or negative direction. Since Thurstone's study there have been numerous experiments conducted that have evaluated some aspect of the relationship between instructional media and the attitude formation and change of students. Over two hundred of these experiments were reviewed by Simonson (1977; 1979; Simonson, Thies, & Burch, 1979). Generally, the results of those studies were not uniform enough to produce a single, definitive conclusion concerning the relationship between mediated instruction and attitudes. Results were often contradictory. However, there were a considerable number of studies in the literature where researchers were able to produce positive attitude results, similar to Thurstone's. In other words, educational researchers reported findings where instructional media was used to deliver messages, and desired or hypothesized attitudinal outcomes were produced.

While a review of the literature is not intended here, it is important for the instructional developer to be aware of the type and scope of positive relationships that have been reported to exist between mediated instruction and the attitudes of learners. This paper attempts to document procedures that were successful in experimental situations in producing desired attitudinal positions, and that would seem to be useful information for the instructional developer. These techniques will be supported by citing a sample of specific research studies where the procedure was successfully validated. Naturally, the instructional developer should apply these recommendations skeptically. The very nature of educational research prohibits the development of conclusions about the learning process that can be universally applied. The following statements are intended as guidelines only, not laws or rules.

Obviously, most instruction is designed to produce cognitive outcomes. Attitude positions are usually of secondary importance when learning processes are developed. However, because attitudes are thought to be 'predispositions to respond' those attitudinal positions that are related to instructional procedures or content might possibly be important to the instructional developer.

While a positive link between attitude and achievement has been identified by some (Simonson and Bullard, 1978; Simonson, 1977; Levy, 1973; Fenneman, 1973; Perry and Kopperman, 1973; and Greenwald, 1966, 1965; for example), most researchers have been reluctant to propose any cause and effect relationship between these two learner variables. Because the relationship between attitudes and achievement has been examined by many, with unclear conclusions often resulting, the reason for the instructional developer to be concerned with attitude positions resulting from instruction should not be based primarily on the impact of attitude on achievement. Rather, the development of a more favorable attitude toward instruction or subject area is a desirable end in itself. Fleming and Levine (1978) have provided additional reasons why the instructional developer should be interested in the attitudes of students. First, most teachers would agree that there are cases when it is legitimate, and important, to urge learners to accept the truth of certain ideas. In other words, to promote an attitudinal position. Second, as stated above, that while the relationship between attitudes and learning is unclear it seems to be common sense that students are more likely
to remember information, seek new ideas, and continue studying when they react favorably to an instructional method and certain content areas. Last, the instructional developer should be aware of procedures that are likely to influence attitudes in one direction or another so that bias can be reduced when inappropriate. Whatever the reason, attitudinal outcomes should be important considerations for the designer of instruction.

By applying these definitions and explanations, researchers have attempted to evaluate the impact various instructional procedures have had on attitude formation and change.

Design Guidelines

Once the instructional developer has determined that a certain attitudinal outcome or attitude change is desirable, then there is a series of research-based procedures that can be considered, and if appropriate, applied, to promote the likelihood of producing certain attitudinal outcomes in learners. The six guidelines listed below are intended as recommendations for the instructional developer to consider during the design process. The reader is reminded that these guidelines are not to be considered prescriptions, rather they are recommendations.

Guideline #1: Learners react favorably to mediated instruction that is realistic, relevant to them, and technically stimulating.

Levonian (1960, 1962, & 1963) reported on a study that incorporated the use of a preproduction survey of the target audience to determine their attitudinal positions, among other things, about India. The results of this survey were used as input to the production of a persuasive film on India. Supposedly this approach made the resulting instruction more relevant and realistic to the audience, and this contributed to attitude changes. Tests of hypotheses indicated that desired attitude positions were produced in viewers of the film.

Seiler (1971) found that if persuasive messages were presented by media they were most effective if the visual channel supplemented the verbal through the use of technically relevant graphics or good quality "human-interest" photographs. Klapper (1958) also reported that highly visualized lessons were perceived as most realistic by learners and seemed most likely to produce desired attitudes.

Relevance and realism were examined further by Croft, et al. (1969) and Donaldson (1976). Both reported that "live" messages were the most realistic to learners and were most effective in producing attitude changes toward intercollegiate athletics and the disabled. Found to be next most realistic and effective were television messages on these topics. Booth and Miller (1974) and Winn and Everett (1978) investigated the realism produced by pictures produced in color versus those only in black and white. They reported a relationship between the use of color, realism, and attitude formation.

Two additional studies provided interesting information on the correlation between realism and attitude change. McFarlane (1945) found that eight and nine year olds seemed most influenced attitudinally by "story" films rather than "nonstory" films. Ganschow (1970) also reported nonstatistically significant, but important, trends in a study on attitudes toward occupations. It was found that when an actor's ethnic group was the same as a viewer's the subject identified with the actor, thought the instruction was realistic, and scored higher on attitude-toward-actor's-occupation inventories.

While this sample of studies certainly provides far from conclusive support for Guideline #1, they do seem evidence enough to warrant consideration of this idea when attitude outcomes are desired.

Guideline #2: Learners are persuaded, and react favorably, when mediated instruction includes the presentation of new information about the topic.

Levonian's (1969, 1962, & 1963) studies lend support to the intent of this guideline. When the audience was surveyed about India, it was possible for the developer of the film to use this information to ascertain previous knowledge about India so that new information could be presented. This new information was included to support the attitude position desired by Levonian. Jouko (1972) reported similar results. It was found that the less preinstruction knowledge students had about a topic the more attitude change that was produced after an informational and persuasive lesson. In other words, there...
was a negative relationship between preinstruction familiarity to topic and attitude change as a result of a persuasive communication.

A similar conclusion was proposed in a study by Knowlton and Hawes (1962). They correlated attitude with knowledge about a topic and found a positive relationship. In this study it was determined that knowledge about a topic was often a necessary prerequisite for a learner to have a positive attitude position toward the idea. Stated another way, new knowledge may need to be supplied when attitude changes are desired (e.g., Jouyko, 1972), or knowledge may need to be present for a learner to have a favorable attitudinal position toward a topic (Knowlton and Hawes, 1962).

A corollary to Guideline #2 was proposed in a study by Peterson and Thurstone (1933). They reported that younger children were influenced more by persuasive films than were older children. They also found that a series of related films seemed to produce a cumulative influence on attitudes. Possibly, younger children acquired more new information than older, more knowledgeable children as a result of viewing the persuasive films, and this contributed to their more significant attitude changes.

It would seem that positive attitudinal outcomes are most likely when the cognitive component of attitude is considered in the design of persuasive instruction. Level of knowledge is an important variable when attitudinal outcomes are sought.

Guideline #3: Learners are positively affected when persuasive messages are presented in as credible a manner as possible.

Source credibility has been recognized as an important criteria for attitude change since the early 1950’s. When mediated instruction is developed it will often be valued positively, and attitudinal positions advocated in the materials will be influential, if the persuasive message is delivered by a credible source or in a credible way. Kishler (1950) found that when the actor in a persuasive film was cast as a member of a highly credible occupational group it was likely that attitude changes advocated by the actor would be produced.

Credibility can also be simulated by the way material is presented. Sellers (1971) produced three videotaped versions of a persuasive speech on the Vietnam War. It was found that the greatest attitude changes were produced in learners who viewed either technical graphics or “human-interest” photographs as a part of their visual message, as contrasted to a “talking-face” version. It was concluded that the visuals added credibility to the persuasive argument presented in the speech.

OBrien (1973) provided additional support for Guideline #3 in a study dealing with the impact of televised instruction on attitude change of rural and urban elementary school students. It was found that urban children identified with television as a method of instruction, Rural students considered a live communication to be most credible. In each case the most credible form of instruction delivered the most powerful attitude change message.

The content of mediated instruction is probably the most critical variable in determining attitude formation and change. If that information is presented logically, and intelligently (i.e., credibly) it is likely that it will be favorably received and will be persuasive.

Guideline #4: Learners who are involved in the planning, production, or delivery of mediated instruction are likely to react favorably to the instructional activity and to the message delivered.

Active involvement in the learning process was examined as a component of several research studies. Erickson (1956) found that students who actually produced a film on science concepts reacted more favorably toward instruction and toward science than did students who only watched science films. Coldevin (1975) involved students in message delivery through the use of various review and summarization techniques that were a part of the instructional sequence. It was found that short reviews after TV lesson subunits produced the most favorable attitude reports in students. Simonson (1977) conducted an experiment where students were convinced to make counter-attitudinal videotapes without realizing that attitude change was the primary purpose of this activity. The process of involving subjects in the making of these videotapes was found to be successful in producing significant attitude changes in subjects.

Microteaching is an involvement technique that has been found by many educators to be successful in changing attitude positions of preservice teachers. One study, of many in the literature, that evaluated the impact of microteaching in a somewhat controlled situation was conducted by Goldman (1969). It was reported that microteaching of self produced significant attitude changes toward self in college females.

It would seem that in the affective domain the active learner perceives instruction and information more favorably than does the passive learner, all other things being equal. Student involvement is an important technique for promoting desirable attitudinal outcomes.

Guideline #5: Learners who participate in postinstructional discussions and critiques are likely to develop favorable attitudes toward delivery method and content.

A powerful technique for promoting favorable attitudes that was evaluated by several researchers consisted of the addition of follow-up discussions to the instructional sequence. These follow-ups usually involved learners in an analysis or critique of the instruction and message presented. Allison (1966) found that only when postviewing discussions were included after students watched motivational science films did significant attitude changes occur. Fay (1974) reported similar findings in a
study that used follow-ups to a film on the problems of the handicapped and the need for "barrier-free" buildings. Attitudes toward continuing education were significantly altered after classroom teachers saw a film and participated in a discussion on the subject. This study was conducted by Burrichter (1968).

An interesting variation to the studies reported on above was conducted by Domyahn (1972). In this experiment students viewed a nonpersuasive film on the responsibility for the fall of Eastern Europe to the Communists after World War II. Domyahn reported that attitude changes were produced only in the treatment groups that participated in persuasive critiques after viewing the film.

Guidelines #4 and #5 are directed toward the behavioral component of attitude. When learners are involved in the instructional situation it is likely that they will value the learning process positively and will maintain or develop favorable attitudes toward the content presented. Again, it is important to remind the reader that these guidelines are only recommendations, and in a given situation may not be as effective as indicated by the results of studies reported above.

Guideline #6: Learners who experience a purposeful emotional involvement or arousal during instruction are likely to change their attitudes in the direction advocated in mediated message.

Janis and Feshbach (1953) presented a slide/audiotape program on the effects of poor dental hygiene to high school students. They varied the intensity of a fear-arousing appeal in three versions of the presentation to determine the most influential delivery technique. All three methods were successful in producing aroused, affective reactions in the students. However, it was found that a minimal fear-arousing appeal was most successful in modifying attitudes because the stronger versions left students in a state of tension that was not alleviated by the remedies offered during the slide show. Janis and Feshbach concluded that strong, fear-producing appeals were not as effective in changing attitudes as were more moderate appeals because the audience became motivated to ignore the importance of the threat to reduce the tension they felt.

Rogers (1973) reported on a study that supported this position. Public health films dealing with cigarette smoking, safe driving, and venereal disease were tested in three different studies. It was found that the more ominous a film was the more fear that was aroused in viewers. However, it was also reported that these fear-arousing films were most effective in changing attitudes when preventative or statements of probability of exposure to the malady discussed in the film were included as part of the motion picture.

Miller (1969) examined the degree of emotional involvement produced in viewers of motion or still picture versions of the same script. It was reported that the motion picture version produced the higher positive evaluation by students. Miller concluded that this was because of the increased involvement in viewers of motion pictures.

Again, the studies supporting Guideline #6 indicate that viewers' participation in the learning process is important when attitudinal outcomes are desired. In these cases involvement was emotional, rather than behavioral, as it was in the studies cited to support Guidelines #4 and #5. It would seem that learner involvement is a powerful technique for the instructional developer to use if attitudinal outcomes are to be an important consequence of instruction.

Conclusion

Attitudinal outcomes should be a concern to the developer of teaching materials. Techniques likely to produce a favorable reaction in students should be identified, refined, and evaluated routinely as a part of the design and delivery of instruction process. It was readily apparent after studying the guidelines and research summarized in this article that type of media was only one of a number of variables that were found to influence attitudes. Media were primarily carriers of information in these studies. There was no "best medium" found for producing attitudinal outcomes. However, there probably is a "best approach" for the development of instruction that will maximize the likelihood of desirable attitudes being fostered in learners in a given situation. By critically applying the general guidelines listed above, the instructional developer should be well on the way to promoting attitudinal positions in students that are likely to contribute to a healthy, positive learning environment.

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Instructional Development Project: Five-Semester Report on an Innovative Introduction to Psychology Course

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Statement of the Problem

Undergraduate programs in psychology have become a national phenomenon. While general enrollment trends in postsecondary education have shown a decrease, psychology programs have shown enrollment stability and many have experienced enrollment increases. The May, 1974 issue of the APA Monitor, a journal of the American Psychological Association, cited the growth in graduate school enrollments at 12.5 percent. This, in turn, indicated a growth in the undergraduate programs that prepare students for Psychology-related jobs, for graduate programs in psychology, and for graduate programs in related fields.

The same situation was true within the State University of New York (SUNY). All of the undergraduate psychology programs in SUNY have demonstrated enrollment stability and many have experienced increases. Furthermore, it should be noted that these increases represent both students majoring in psychology and nonmajors fulfilling other program requirements or taking elective courses.

At the State University College at Oneonta, the Psychology Department experienced an "enrollment crush." While general enrollment demand has remained consistently strong, the introductory and basic courses realized an enrollment growth of 20 percent—and this does not fully represent the enrollment demand for these courses. Psychology 100 is the introductory course for majors and non-majors in the Psychology program at Oneonta. It was taught as a multiple-section, three-lecture per-week course. And it was the primary source of a dilemma affecting the total operations of the department and the scope and depth of the entire Psychology program.

There were six problems—academic and fiscal—associated with the Psychology 100 course. First and foremost was the "enrollment crush" affecting the discipline. Because the course was a typical multiple-section course, taught as lecture/discussion three times per week, the response was 115% enrollment pressures had been to cautiously increase the size of the sections—regarded as a necessary evil. However, the department anticipated that sections would become so oversized that the academic quality of the course would be sacrificed. Preliminary plans were made for a course revision based on enrollment projections for the Fall of 1974. That enrollment projection was for 360 students to be taught in eight sections of 45 students each by four faculty members. (See Figure 1.) In the face of the "enrollment crush", this course actually served 515 students in the Fall of 1974—an unanticipated increase of more than 40 percent—taught in nine sections by five faculty members. (See Figure 2.)

Author Note

From the time of its inception this project has depended upon the efforts of many dedicated people. Sincere gratitude is due to the following:

Keith Bernhard, former assistant for instructional development at the Instructional Resources Center was was co-author of the original proposal and provided outstanding leadership in the initial phase of the development process.

Mike Siegel, chairman of the psychology Department for his commitment of the resources of the department and the many hours he contributed to the development of the course in spite of an already demanding schedule.

Steve Gilbert and Robert Leslie, assistant professors of Psychology who as two-thirds of the department’s contribution to the development team gave unselfishly of their time and effort to make this project a reality.

The staff of the Instructional Resources Center who provided valuable technical assistance in the development of a variety of instructional materials.
internally (in this case, redeploying faculty lines between departments) when most operational regulations (in this case, tenure rights) are based on an assumption of continuous growth and, therefore, preclude steps that may be valuable in a "zero growth" situation. This phenomenon at the college level had manifested itself as a critical faculty shortage for the Psychology Department. In addition, the department's heavy investment of faculty time in Psychology 100 had limited the overall scope and depth of the psychology program at a time when enrollment trends dictated otherwise. Students majoring in psychology found that valuable courses and experiences were unavailable because faculty time was unavailable.

There was irony to the third problem. With the "enrollment crush" in the Fall of 1974, some section sizes were greatly enlarged. With 75 students to a section, they became, in effect, large-lecture sections. However, these sections were not large enough to use Lecture Hall facilities fully. So the effect had been that, in terms of facilities utilization and the academic suitability of large-lecture courses, more psychology faculty had actually been deployed in this course than may have been needed. (Of course, this point does not include logistical considerations, and it does not account for faculty sentiment. The psychology faculty had resisted offering a large-lecture, 350-students-per-section, three-lectures-per-week introductory course because many introductory courses formulated this way and poorly conducted have prompted negative reactions from students).

Fourth, the "academic viability" sought in multiple sections of small-to-medium enrollment had been compromised by ballooning the enrollment in those sections far beyond the norm. Consequently, while more students had been able to enroll in a popular course and while operating costs had remained constant (actually realizing a net gain per student credit hour generated), faculty and students had become dissatisfied with the quality of the course in general—there had been a decrease in class dialogue, individual student needs attainment and student progress were not being monitored adequately, and there was little opportunity for the faculty member to vary the instructional experiences (e.g., actual laboratory sessions and clinical observations instead of lectures about laboratories and clinics).

The fifth problem was essentially academic. The introductory Psychology course lacked uniformity across sections with a number of faculty members teaching the course. These faculty have academic specializations and biases, thus students in one section could encounter experiences and topics very different from students in another section. So that students may experience the full scope of the discipline in an adequate and acceptable way, a carefully defined syllabus had to be established.

Lastly, the department sought ways to assure that academic standards in Psychology 100 could be maintained as enrollments fluctuated. The department was still projecting enrollment increases—based on national trends. However, enrollments would eventually taper off at some point, and the department wanted to be able to redeploy faculty contact hours without sacrificing instructional quality in the Psychology 100 course. This, of course, was essential to the well-being of the college as a whole.

To put some perspective on the fiscal conditions of the Psychology 100 course during the Fall 1974, a cost analysis was completed. These costs reflected actual personnel and instructional support costs only. These costs also represented a savings per student credit hour generated when compared to the operating costs originally anticipated. However, the faculty members were quick to point out that, with these net savings, there was also a sacrifice of academic quality. Therefore, any proposed revision of the Psychology 100 course had to do two things: it must provide for a savings to the department and it must provide for greater uniformity of content across multiple sections. The latter would be considered an improvement of the quality of the course.

Proposing a Solution
Parameters
Solutions were acceptable only when they adequately conformed to certain parameters. Because the Psychology 100 dilemma was complex and had costly ramifications for the Psychology Department, the essential parameters were outlined in advance. In this way, potential solutions could be evaluated with respect to these parameters. Similarly, the parameters themselves could be gauged for their utility and meaningfulness by comparing them against some reasonable and appealing solutions. Accordingly, the Psychology Department and the Office of Instructional Development collaborated in identifying three sets of parameters for potential solutions. These parameters pertain to the design, development, and implementation stages, respectively. (See box, page 22.)

With the 18 parameters in mind, many solutions could be proposed. It is important to note that the modes of instruction were not specified. Neither
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<tr>
<th>Design Parameters</th>
<th>Development Parameters</th>
<th>Implementation Parameters</th>
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<tr>
<td>1. The instructional design for Psychology 100 must be representative of the discipline.</td>
<td>1. A search of existing curricular/instructional systems and materials must be conducted before devising new (and untested) ones.</td>
<td>1. The implementation of the developed course must be consistent with design specifications.</td>
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<td>2. The design must accommodate individual student abilities, interests, and needs (within the limitations of an introductory course).</td>
<td>2. Developmental testing of all instructional materials must be included in the development process.</td>
<td>2. The developed course must be planned to operate for at least six terms (semesters).</td>
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<td>3. The design must accommodate one or more large-lecture sections of up to 385 students each (permitting full use of the Instructional Resource Center's (IRC) largest lecture hall, permitting expansion to meet the large enrollment demands that existed and permitting contraction should enrollment demands diminish).</td>
<td>3. The faculty of the department must be informed about development activities at regular intervals.</td>
<td>3. Course revision processes must be included in implementation.</td>
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<td>4. The design must provide for ongoing evaluations of curriculum design, instructional performance of faculty and supportive materials and activities, and student performance (and other measures to ensure academic accountability).</td>
<td>4. Constructive feedback from all departmental faculty must be encouraged.</td>
<td>4. Provisions for the validation of “courseware” must be included in implementation.</td>
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<td>5. The design must not cost more to develop and operate over a six-term interval (e.g., per student credit hour or FTE) than the traditional multiple-section, three-lectures-weekly format.</td>
<td>5. Local resources must be sought before seeking outside assistance.</td>
<td>5. Periodic reports on course implementation must be filed with the departmental faculty and the Office of Instructional Development.</td>
</tr>
<tr>
<td>6. The design process must adhere to a cost-accounting procedure.</td>
<td>6. A cost-accounting procedure during development must be maintained.</td>
<td>6. A cost-accounting procedure must be maintained during implementation.</td>
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were logistical limitations. The design, development, and implementation of an academically sound, flexible, and responsive set of instructional experiences and activities were central to the formulation of these parameters. A course design that could achieve these within certain cost restrictions was fully acceptable.

A Solution

One such solution was composed of some large-lecture sessions, some traditional class discussion sessions, and some atypical laboratory and field experiences. This solution is shown in Figure 3. The design involves only three faculty members and draws upon 12 upper-division undergraduate students to serve as “teaching assistants” (TAs), tutors for self-instructional activities, laboratory assistants, “participant observer” evaluators, etc. (These students would be gaining course credit in Psychology 298, an internship in psychology).

From an academic perspective, this proposed configuration could accommodate the four major dimensions of the discipline—developmental psychology, clinical psychology, experimental psychology, and social psychology—as represented by the three faculty members. In addition, all students taking the Psychology 100 course would benefit from their contact with all three of the faculty members—particularly in the large-lecture sessions that would meet at least once per week. These would serve as motivational experiences, as opportunities to bring in guest speakers, as opportunities to deal with questions of general interest, etc. Also, the course would have the flexibility to involve students in self-instructional experiences, in laboratory experiences, and in small group discussions, as appropriate. Tentatively, groups of 43 students would be scheduled for self-instructional activities and tutoring. (In Figure 3, a third of the class time would be allocated for self-instructional and related activities.) That is, students would draw upon self-instructional modules (likely housed in the new self-instructional facilities in the library) complete them prior to laboratory sessions and other class meetings.

Small groups would be formed in the remaining third of the class time in a given week. These small groups meetings would accommodate just over 20 students. Small group meetings could be used for class discussions, laboratory experiences, and other special activities (where small to-moderate group size is an advantage). Faculty members and student assistants would rotate their schedules so that each small group would meet with the faculty member every other week. In this way, each faculty member would meet with 88 students weekly, 176 students every two weeks.

From a fiscal perspective the solution in Figure 3 had many advantages. First, while the course would be functioning with the equivalent of 38 weekly faculty
contact hours (WFCOH)—up from the 27 WFCOH actually deployed in the Fall 1974 configuration—the three faculty members would actually account for only 14 of those contact hours. This meant that, while the students in Psychology 100 gained increased personal contact in the course (e.g., for better monitoring of their performance), fully 1½ faculty lines were being saved. This savings could be redeployed into other development projects for the Psychology Department, into offering up to four additional courses, or split between development projects and new courses, or put to different uses altogether. Second, this solution actually reduced overall operating costs. Furthermore, if the course was offered in this form for more than six terms and/or if the enrollment continued to rise, the overall cost per student credit hour generated was reduced. Given the Psychology Department’s commitment to the course revision and given the enrollment trends affecting this course, decreases in student credit hours generated seem unlikely.

The Development Process

The Psychology Department recognized the need for revision of the academic program and improvements in instructional techniques. The approach to this problem was to apply the processes of curricular/instructional development. Curricular/instructional development is the systematic designing, developing, evaluating, and implementing of instruction. The subject matter of a course was carefully reviewed and sequenced, instructional designs were proposed (based on effective techniques to enhance communications and learning), instructional activities and instructional materials were factored into an “instructional system,” and when appropriate, original instructional materials were produced and tested. Furthermore, an evaluation system was superimposed on the development process and on the developed course so that effectiveness was assured and so that revisions were likely to be both adequate and accurate. A sample model of the curricular/instructional development process is shown in Figure 4, from Syracuse University’s Center for Instructional Development (1975).

In the case of Psychology 100, the three faculty members who would offer the revised course would be the “subject matter experts” on a “development team.” In this way, experts in content and experts in process can work collaboratively on the project. A proposed timetable is summarized in Figure 5.

During the Fall semester 1974, the three psychology faculty members and personnel from the College’s Office of Instructional Development began the design process for the course. Not only was the course outline developed in detail, but an evaluation system was constructed. Furthermore, they began a preliminary search of existing instructional materials in accordance with the course outline specifications.

During the Spring semester, 1975, the evaluation system was applied (as appropriate) to the existing traditional course to gather baseline data. In addition, new instructional materials, faculty guides, and other materials were developed and tested. This activity required an extensive application of resources from the Psychology Department and the Instructional Resources Center.

“Final” revisions were completed during the summer of 1975, so that the course could be implemented in its new form in the Fall semester 1975. The involvement of the three faculty members in the development process was provided without remuneration, a deed exemplifying the firm commitment of the three to the project. Additional revisions were anticipated during the six-term lifespan of the course, but the course was in substantially final form by the Fall, 1975.

Costs and Resources.

Three sets of costs affected the total cost of the Psychology 100 Development project. The cost of designing the course (which involved personnel time
Figure 4. The Process for Instructional Development

Figure 5. Activities and time frames for the curricular/instructional development of Psychology 100
exclusively) was estimated at roughly $3370. The cost of developing and testing the instructional materials and related materials (excluding facilities and equipment costs) was estimated at roughly $17,730. The cost of implementing the course in its revised configuration, with some provision for minor modifications, was estimated at roughly $15,080 per term. Therefore, the total cost for developing and implementing a revised Psychology 100 course for a period of six terms was roughly $113,580. This represents a savings of $29,600, when compared to what the course would cost if offered under the Fall 1974 configuration for six terms ($141,580).

To realize these and other savings, the department had to invest faculty time in the rigorous curricular/instructional development of the Psychology 100 course. As indicated above, the total design and development costs associated with the project were estimated to be roughly $21,100. This figure includes the faculty time needed to perform development duties, the time of Instructional Resources Center personnel to perform design and technical duties associated with the project, and the cost of project materials.

The college provided fiscal support to these activities, but only in part. The faculty time spent in the Fall 1974 (during course design) and the entire time spent by the Instructional Resources Center personnel throughout the project was underwritten by the college. Thus, the college's investment in the development of Psychology 100 was estimated at roughly $9100. However, funding was required for the crucial period of materials, design, development, and testing during the Spring, 1975. It was at this time that the faculty became intensively involved in development duties. This was also the period when most course-related materials costs were incurred. With sufficient funds to hire replacement faculty for the three participating faculty, and with funds to support materials costs, the curricular/instructional development project in Psychology 100 was completed as outlined above. Therefore, the amount of funding requested was $12,000.

Evaluation

For the curricular/instructional development project to be adequately assessed, an evaluation system had to be functioning from the outset. This evaluation system had to be able to monitor the activities of the development process and the implementation of the courses that undergo development. Furthermore, the evaluation system had to use means that were suitable for application outside the sphere of developed courses—enabling some comparison between instructional experiences that have undergone development and those that have not.

The academic parameters affecting the evaluation of the curricular/instructional development process reflected a need for adequacy in the curriculum design, the need for appropriate standards of student performance, the need for appropriate criteria for determining the adequacy of instructional materials and the need to manage a development team's activities in a collaborative and responsible way. The fiscal parameters affecting an evaluation of the development process reflected the need for allocating resources to development activities in a prudent way.

Once the course had undergone development, the principal concern was to determine course effectiveness. Fiscal parameters were limited to maintaining the course operations within some predetermined fiscal limits. Once this was ensured, the issue of academic viability became central. In this respect, the academic parameters affecting course implementation reflected a need for ensuring student performance above some minimum standard, a need for accommodating student needs. A need for monitoring the effectiveness of instructional materials and instructional activities, and a need for examining the broader effects of the course on related courses, other faculty members, and on other disciplines.

In the Psychology 100 development project, the three faculty members were involved at the outset in the design of an evaluation system for the course. Subsequently, they became involved in the development of instruments and procedures that would provide data to answer questions about the viability of the course design, the course implementation, and the development process as it affected them. In addition, the Instructional Resources Center personnel were involved in the development and implementation of means by which their activities in the curricular/instructional development process could be monitored. By using these instruments and procedures, the academic and fiscal parameters affecting the development of Psychology 100 could be used to evaluate the performance of the course, the development process, and, lastly to provide some means by which the viability of alternative instructional designs and development techniques could be predicted for future projects.

Anticipated Outcomes

Two types of outcomes were anticipated from the systematic curricular/instructional development of the Psychology 100 course: academic and fiscal. Some represented immediate gains while others pertained only to a longer term. Furthermore, the outcomes from this project were to fulfill two conditions: improved academic quality and decreased cost. That is, the anticipated outcomes would show "more for less." This is unusual and points up the severity of the Psychology Department's dilemma with the Psychology 100 course. The Psychology Department would have been equally satisfied if the revised course improved academic quality and costs remained the same.

There were at least seven academic outcomes anticipated from this project. First it was expected that the psychology discipline would be adequately and fully represented in the revised course. Second, there should be better coordination between the instructional materials used in the course and the instructional activities in the course. Third, there should be improved uniformity across class sections regarding course content and instructional experiences. Fourth, student performance in the course could be monitored more adequately. Fifth, student performance in the psychology program as a whole should improve, especially as students proceeded to more advanced courses. Sixth, due to fiscal gains outlined below, other courses could undergo rigorous curricular/instructional development as part of a "development cycle" to help revise the psychology program. And seventh, the psychology department should be able to offer more courses, particularly those courses that had been proposed but not offered.

The fiscal gains were equally as important, primarily because they permit
the continuation of a "development cycle" and the related fiscal flexibilities that are crucial to the college as a whole. There were at least five fiscal outcomes anticipated from this project. First, fewer actual faculty contact hours would be required to teach the course in the proposed format. Second, the revised Psychology 100 course should cost less per student credit hour than other large-enrollment, multiple-section courses. Third, the proposed format should accommodate enrollment fluctuations—up or down—without varying the course costs appreciably (e.g., without adding or dropping faculty to teach small sections). These first three gains represent increased fiscal flexibility. With increased fiscal flexibility, the fourth and fifth gains would be feasible.

Fourth, the revisions to Psychology 100 should permit the department to generate more student credit hours or FTE’s—e.g., via new courses—without adding faculty to the department. And, fifth, the revisions to Psychology 100 should permit the department to invest some faculty hours in a cycle of curricular/instructional development. This would reduce the need for the department to seek outside funding to support a faculty member’s "assigned time" to development and should result in a better overall program—academically and fiscally—for the Psychology Department.

According to the estimated development and operating costs for the course revision, the new Psychology 100 course could cost slightly more than $59 per student credit hour. This would be a savings of more than 40 percent for each semester the course is offered. And the savings become even greater if the course is offered in this format for more than six terms. In addition, enough weekly faculty contact hours could be saved to account for less than one and one-third faculty lines or the equivalent of four additional courses. This might be considered a $16,000 savings annually. However, if these faculty contact hours were invested by the department as "assigned time" to curricular/instructional development for the design and development of one or more courses per semester, additional savings would begin to accrue, contingent upon the potential savings from these courses. In short, the external funding required to pursue development of this course might be regained within one year.

Method of Evaluation

It was hypothesized that the newly developed structure for presenting the Introduction to Psychology course would produce the following outcomes: (1) the direct cost for presenting the course would be reduced as compared to the cost of offering the course under the traditional structure, (2) because savings would result in redeployment of staff for the development and offering of additional courses at the upper division levels, the course under the new structure would provide for a broader educational experience, and (3) the course would foster the development of a more favorable attitude toward Introductory Psychology and the field.

The total direct costs for the Introduction to Psychology course were computed on the basis of two cost inputs: faculty salaries and the Psychology Department's instructional support budget. Faculty salaries, which are reported on an annual basis, were assigned to the course in the following manner. First, the annual salary for each of the participating faculty members was divided in half to reflect the appropriate salary costs for a single semester. This amount was then divided by the total weekly faculty contact hours assigned to each individual during the term studied. This calculation provided a salary cost per faculty contact hour for each instructor for the semester.

Departmental support consists of three items. First is the department budget for supplies, telephone, travel, etc., which represents general funds to be expended by and for the members of the department. The second item is the salary of the full-time department secretary. The third item considered is the portion of the salary of the department chairman commensurate with the fraction of his time devoted to administrative responsibilities. This fraction has varied from one half to three quarters in the five semesters during which the model course has been offered.

The monies allocated to each of these three items were combined to reflect an annual support budget, then divided in half, as were the faculty salaries to provide a semester department support budget. This figure was subsequently divided by the total full-time equivalent (FTE) faculty positions assigned to the department for the semester. The quotient derived represents an equal apportionment of the department support budget on a per faculty basis. Further division of this figure by each individual's weekly faculty contact hour total provides a support dollar cost per weekly contact hour for each faculty member in the department.

At this point one's disposal are the weekly faculty contact hours costs from the salary and support categories. These amounts, when combined, represent the total direct weekly faculty contact hour costs for an individual faculty member.

This dollar figure, when multiplied by the number of weekly faculty contact hours each instructor is assigned to the Introductory Psychology course, represents the total direct departmental cost per individual faculty members responsibility to this course. Summing these figures provides the total direct cost to the department for the offering of the "Intro" course for a specified semester. To these costs must be added a share (one sixth) of the amortized instructional development cost incurred in 1974-75 and the single semester operating support expenditure. The sum of all calculations is the total direct cost of the basic psychology course.

The total direct cost is then divided by the total course semester credit hours (enrollment × 3 credits per course) to attain a cost per semester credit hour (SCRH). When multiplied by 15, the number of student credit hours of one full-time equivalent (FTE) undergraduate student, the cost per FTE student is established.

Besides the financial aspects, two formal techniques were used to evaluate the cognitive and affective attitudes of the students in the new course. First a questionnaire was administered two weeks prior to the end of each semester. This instrument was designed to measure students' feelings about eight course related issues: (a) study guides, (b) Monday (large lecture) presentations, (c) midweek and Friday presentations, (d) course structure, (e) teaching assistants' performance, (f) teachers' performance, (g) area examinations, and (h) overall evaluation of the course.

Second, the Undergraduate Program of Counseling and Evaluation Field Test in Psychology (UPCEP) was given to a random sample of 52 students culled from sections of the traditional course during its last semester of operation, and to random samples of approximately the same number of students near the end of four of the five semesters.
of the new course. The UPCEP, administered by Educational Testing Service, presents approximately 16 multiple choice questions in each of nine categories: clinical, physiology, sensation and perception, learning and motivation, methodology, applied, personality and social, and cognitive and complex processes.

Informal evaluation was based upon observations by instructors involved, recording of comments from students, observations of instructors not involved, and observations by instructional development personnel.

Results

The anticipated outcomes of the new Psychology 100 course were realized with much satisfaction.

Cost Analysis

The total direct cost of offering the new course in the new format was greatly reduced. Table 1 reveals the

Table 1. Cost per Student Credit Hour

<table>
<thead>
<tr>
<th>Semester</th>
<th>Enrollment</th>
<th>Traditional</th>
<th>Experimental</th>
</tr>
</thead>
<tbody>
<tr>
<td>F 1974</td>
<td>515</td>
<td>15.22</td>
<td></td>
</tr>
<tr>
<td>F 1975</td>
<td>450</td>
<td>16.19</td>
<td>13.61</td>
</tr>
<tr>
<td>S 1976</td>
<td>417</td>
<td>20.65</td>
<td>14.59</td>
</tr>
<tr>
<td>F 1976</td>
<td>436</td>
<td>17.27</td>
<td>12.85</td>
</tr>
<tr>
<td>S 1977</td>
<td>329</td>
<td>27.27</td>
<td>15.83</td>
</tr>
<tr>
<td>F 1977</td>
<td>453</td>
<td>16.62</td>
<td>12.54</td>
</tr>
</tbody>
</table>

The total direct cost per student credit hour for the course as it would have been if the course were offered in the traditional manner (column 1) as in the Fall of 1974 with five instructors involved,

and actual cost incurred under the new format (column 2). The actual cost includes the amortization cost for six semesters stemming from the investment of $19,676 in the development process (Table 2). The savings per student credit hour under the new format ranged from $4.38 to $7.66 for the five semesters. The average savings for the five offerings of the course was $5.82 per student credit hour. These dollar savings represent gains of 24.1 percent to 32.7 percent or an average savings of 30.6 percent. The greater cost per student credit hour in the spring semesters is attributable to the normally lower course enrollment during those periods. It is to be noted that each time the course is offered beyond the contracted six semester period, the cost per student credit hour for all previous semesters will be reduced as the amortization cost is treated by a larger divisor.

New Course Offerings

The savings derived from the employment of fewer people in the new Psychology 100 course were transformed into development of additional courses. This provides for a more comprehensive psychology major and increased FTE production by the department. Table 3 lists the new courses made possible by reallocation of staff and the enrollment figures for each by semester. No existing courses were sacrificed in the effort. Since the Spring 1976 semester, the new courses have been responsible for production of more than 130 additional FTE's for the Psychology Department.

The table does not include Psych 297, Teaching Assistantship in Psychology which enrolled 12-15 students for each of five semesters.

Student Evaluation of Course

A study of the responses to the questionnaire assessing student reaction to the course is revealed in Figure 6 which shows evaluations of eight dimensions of the new course over 5 semesters of operation. The evaluations are plotted on a scale from 0 to 1, with 0 representing "very poor," .5 representing "so-so" or "average," and 1 representing "extremely good."

The results of the questionnaire are quite consistent with our impressions of the course. The first two semesters showed essentially the same evaluation in that the course was rated as an average or a "so-so" course. By the end of the third semester, the new course was taking on a new personality.

Most of us felt that the serious problems of the first two semesters were resolved. TA's conducted their classes in a professional manner, demonstrations were appreciated and worked, and complaints about the fairness and difficulty of the tests were rectified. The success of the third semester operation of the course was most welcome and seemed to justify our previous efforts and expectations.

The fourth semester showed a slight regression from that of the third semester. The decrease in 8 of the 8 curves was a result of introducing "new" instructors into the course.

We now were cycling instructors into

Table 3. New Courses Offered

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Psych 237 - Biofeedback, Meditation, Self Regulation</td>
<td>-</td>
<td>-</td>
<td>57</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Psych 237 - Psychology of Human Sexuality</td>
<td>28*</td>
<td>18*</td>
<td>62*</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>Psych 265 - Topics in Social Psychology: Attitudes and Behavior</td>
<td>-</td>
<td>69*</td>
<td>22</td>
<td>74</td>
<td></td>
</tr>
<tr>
<td>Psych 266 - Topics in Social Psychology: Intercultural Process</td>
<td>75*</td>
<td>45</td>
<td>35</td>
<td>133</td>
<td></td>
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<tr>
<td>Psych 267 - Psychology Perspectives of Advertising</td>
<td>-</td>
<td>32</td>
<td>-</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Psych 270 - Psychotherapy and Behavior Change</td>
<td>-</td>
<td>-</td>
<td>45</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Int-D 214 - Aggression in Man and Animals</td>
<td>-</td>
<td>-</td>
<td>35</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

*Multiple Sections

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27
Figure 6. Questionnaire results assessing student reactions to the new course
the course who were unsure about their own participation in the new course. For some, the design of the new course conflicted with personal teaching styles and philosophies concerning the use of preplanned materials, common exams across sections, and especially, teaching assistants.

The solution to the fourth semester was to convey to the new members that the course is an evolving entity, where planned activities and examinations may be modified or substituted if the instructors so desired.

The fifth semester showed a dramatic improvement from the fourth semester. In seven of the eight areas examined, the evaluation for the fifth approximated or bettered the third semester, the previously high semester. The apparent regression for study guides merely reflects a change in emphasis in the use of the study guides. The guides no longer served as the primary focus but is now viewed as complimentary to the text.

Thus the results of the questionnaire supported the impression of the instructors. When the course was working well, during the third and fifth semesters, it was obvious to those involved.

**UPCEP Score Gains**

The differences in (UPCEP scores) psychological test scores of students in four of the five semesters of the new course from those of the last semester of the traditional course are shown in Table 4. The results show mean changes over the nine subjects of +5.70 percent, 3.67 percent, 3.26 percent, and 3.19 percent for the four semesters. During the first two semesters, students showed improvement on 8 and 7 (of the nine) subsuits, respectively.

The third semester (during which the second textbook and study guide packet were used) showed improvement on only 4 subsuits. The results show, however, that the mean improvement achieved on these four subsuits was 11.42 percent or more than three times the value of the mean change for the four subsuits on which students did not improve, i.e., -3.25 percent. For the fifth semester (during which a third textbook and study guide packet were used) mean improvement approximates 0 percent.

In sum, the UPCEP results suggested that students in our new course performed at least as well on an objective test as students in the last semester of our traditional course. These gains appeared to be independent of how well students liked our new course. In light of the economic advantages of the new course structure, the evidence that the course could be made both challenging and attractive to students, and the consistently positive UPCEP results, we feel confident in concluding that our new course has met its objectives.

**Observations and Comments**

Though the project has been considered a success it is not to be believed that the roadway was entirely smooth. Resistance to innovation is as common in higher education as it is in any other element of our society. Differences in educational philosophies and teaching styles gave rise to some conflict within the Psychology Department. Though causing disruption in departmental harmony for some time, the polarization could be considered somewhat of a plus from the standpoint of the instructional developer who was assured that the personnel who became engaged in the redesign project were strongly committed.

There was concern on the part of the psychology and other departments for the manner in which the administration would deal with generated savings. Fear of success in the project leading to loss of staff were soon allayed by the administration.

During the first semester of the new course there were problems centered about testing procedures, grading models and ill-prepared teaching assistants. Students complained that Psychology 100 required more study than any other course. Testing procedures were revised, grading models established, and better screening procedures for teaching assistants greatly reduced problems during the second semester. Additional modifications all but eliminated difficulties beyond the second semester.

Informal evaluation via discussion with students, teaching assistants and faculty associated with Psychology 100 has revealed some very positive outcomes of the course.

Students expressed belief that, following their Psychology 100 experience, they were "doing better" in other related courses and they felt more comfortable with psychological concepts. They demonstrate a broader understanding of experimental methodology as reflected in their ability to design an experiment and facility for interpreting and evaluating the results of the experiment.

Many students rated Psychology 100 as the most interesting course offered at the college because of its uniqueness, characterized by varying class sizes, large lecture, small discussion groups, and the use of teaching assistants. It was felt that the course fosters an atmosphere for inquiry as students expressed increased feeling of freedom to ask questions.

Teaching assistants have demonstrated greater breadth and depth in their understanding of the field of psychology. Psychology 100 provided an opportunity for psychology majors to gain experience in teaching which was

<table>
<thead>
<tr>
<th>Subtest</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical</td>
<td>(34.09)</td>
<td>+10.15%</td>
<td>+10.56%</td>
<td>+20.94%</td>
</tr>
<tr>
<td>Physiology</td>
<td>(43.03)</td>
<td>-0.12%</td>
<td>-9.63%</td>
<td>-4.47%</td>
</tr>
<tr>
<td>Sensation/Perception</td>
<td>(32.00)</td>
<td>+8.79%</td>
<td>+1.26%</td>
<td>-8.20%</td>
</tr>
<tr>
<td>Learning/Motivation</td>
<td>(20.00)</td>
<td>+2.43%</td>
<td>+2.17%</td>
<td>-1.29%</td>
</tr>
<tr>
<td>Methodology</td>
<td>(41.06)</td>
<td>0.74%</td>
<td>-0.39%</td>
<td>-1.05%</td>
</tr>
<tr>
<td>Applied</td>
<td>(18.74)</td>
<td>+3.07%</td>
<td>+8.36%</td>
<td>-1.23%</td>
</tr>
<tr>
<td>Personality/Social</td>
<td>(22.66)</td>
<td>+11.82%</td>
<td>+8.28%</td>
<td>+14.60%</td>
</tr>
<tr>
<td>Developmental</td>
<td>(36.60)</td>
<td>+5.42%</td>
<td>+1.52%</td>
<td>+5.28%</td>
</tr>
<tr>
<td>Cognitive</td>
<td>(32.20)</td>
<td>+8.98%</td>
<td>+10.88%</td>
<td>+4.49%</td>
</tr>
</tbody>
</table>

| Mean                     | +5.70%  | +3.67%  | +3.26%  | -0.18% |

| There was no test administered in the 4 semester |

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not readily available previously. One outcome for the students was increased confidence when addressing large groups.

The T.A.'s expressed a preference for the planned activities of the new course because of their comprehensiveness and completeness. They especially enjoyed the opportunity to assist beginning students in the field.

Students having the teaching assistant experience express desire to become more deeply involved with other aspects of the curriculum such as independent study and research activities. These students have also scored higher on standardized advanced tests, thus improving their chances for acceptance to graduate schools.

Faculty associated with the new course favor it for a variety of reasons. They note that the structured nature of the course's management system relieves them from much of the mundane aspects of teaching allowing more time for innovative presentation of material and for meeting the individual needs of students. The course offers a favorable balance of the areas across the discipline. Participating faculty are thus compelled to retain sight of the total field of psychology avoiding a complete retreat to an area of specialization. Teachers in a course so structured as Psychology 100 show an increased awareness of a greater variety of successful activities and teaching techniques outside of their normal behavioral repertoire. This has given teachers a feeling of improved competence and greater self confidence.

Conclusions

We have traced the development of an innovative approach to the teaching of Introductory Psychology. Through five semesters the new course has more than met our personal expectations and the objectives initially delineated. Cost analyses have shown that in its new format the course could be offered more economically than it could in the traditional manner and with improvement in quality.

Our experience showed that the success of a new course is not only determined by financial factors but also by the acceptance of those who are teaching the course and those who are the recipients. Both students and faculty have rated the course positively, preferring it over the traditional course.

The new course with its flexible and unique structure offers an opportunity for more involvement and greater appreciation of the material under discussion.

A powerful residual effect from the new course is the instructor savings factor. Large numbers of instructors are no longer tied to the course but have been set free and encouraged to develop new courses, at the upper level with no sacrifice of existing courses. We have shown accelerated growth in FTE count and an expanded curricular offering to better meet the specialized needs of our students.

In summary, we believe that careful attention and close monitoring of a course can increase its longevity. Our experience is also that a course can be economically efficient, pedagogically successful, and fun to teach. The work is considerable, but the benefits are very real.
Instructional Systems Development in the Next Decade

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As the 1970's come to a close, a reflective mood emerges and causes periods of summative review and of future predictions. This reflectiveness was perhaps the source of two recent articles in the Journal of Instructional Development, Fall, 1978 entitled “The Future of Instructional Development—Through the Looking Glass Darkly” by Kent Gustafson and “Instructional Development: Deliverance” by Kenneth Silber. The authors took diametrically opposed positions of the future of instructional development. Their papers originally were presented for the 1978 Association for Educational Communications and Technology Convention in Kansas City. The authors were asked to take opposing points of view concerning the future of instructional development: Silber positive and Gustafson negative. The articles were admittedly one-sided, and it should be noted that the authors could have switched sides in the debate. Their purpose was to generate professional dialogue, and thus this article and their success.

The Gustafson-Silber Debate

The major thrust of the Gustafson article was that as instructional developers we have not attuned ourselves to the forces of the outside world, e.g., the economy, energy, mood of the public. The point may be a valid one, yet, as with all reflective opinions, this perspective of developers being overly concerned with the inner world of academia may be self-fulfilling rather than descriptive. The underlying premise of this article is that the problems with instructional development today are due to the lack of input from the outside world. This “them against us” metaphor of “outside versus inside world” is often used to create a platform to launch platitudes of doom.

Refuting the conditions of the “outside world” as they impact upon instructional development is not the intent of this article. In fact, most of the issues raised by the Gustafson article can be defused with the conscientious application of the systematized approach to instruction. It can be shown that systematic instruction is more cost-effective than traditional instruction and is therefore recommended during times of diminishing resources.

The Silber article differs from the Gustafson article in being more positive and up-beat in its prediction of the future of Instructional Development. Silber asks the question, “Why is there skepticism about whether or not ID can deliver?” The answer to this question, according to Silber, is that “We... promised to deliver too much too soon—and did not deliver.” This answer may or may not be true, depending upon what was to be delivered. The article then goes on to list the major components of the systematic process of instruction and identifies persons who have contributed to those component processes, e.g., Management of ID, Diamond; Instructional Strategies, Gagné and Briggs; Task/Content Analysis, Merrill, etc. In the conclusion to his article, Silber lists some of the problems associated with the future of ID: (a) keeping pace with new knowledge in the field; (b) discovering additional skills related to how individuals process information; (c) expanding the target audience from higher education to business, industry, medical education, and special education; and (d) finding a professional home for instructional developers.

The problems, according to Silber, unfortunately do not address the question of “Why did we promise too much too soon?” The answer to that question cannot be revealed by examining the outside world, according to Gustafson; or keeping pace with the current body of knowledge or expanding the target audience or finding a professional home, according to Silber. The answer to that question can be found by the introspective examination of what we do and persuade others to do in solving instructional problems.

Before continuing it should be said that the Gustafson and Silber debate raises important and valid issues that must be addressed by all instructional developers at one time or another. Those issues in part are: (a) developing an academic environment that is a subset of a larger environment which influences the instructional development domain, (b) finding a professional platform designed for keeping pace with new knowledge, and (c) acquiring additional skills that could strengthen all participants. However, if the instructional systems approach is to counteract the skepticism about the future alluded to by Gustafson and Silber, we in academic settings must examine our procedures, our techniques, and our limitations. In this way, we can discover our professional direction and determine if it is in fact congruent with our abilities and goals. The remainder of this paper will examine one of the cornerstones of instructional systems design: models of design and development as they translate and dictate the instructional processes. Let's begin with a brief examination of the instructional systems development approach, its components and strengths.

ISD: Improved Efficiency and Effectiveness in Teaching

What is the best way to organize work so that it meets all learning objectives and finishes in the shortest period of time? In the areas of education and training, the last quarter of a century has witnessed the conceptualization and, to some degree, the implementation of the systematic process of developing instructional materials on a large
Fortunately, the operational definition of these components differs in content and procedures across models. A circumscribed definition of each of the five phases will be stated to establish common referent.

Needs Analysis. This activity is usually done within the organization and consists of (a) mission analysis or job analysis, i.e., assigning tasks to job descriptions and (b) training analysis, i.e., determining manpower, facilities, and equipment requirements to maintain the training setting. It usually includes administrative and policy constraints.

Design. The design phase of ISD consists of five major activities: media selection, course organization, lesson specification, evaluative feedback, sequencing, and implementation strategies. Each of these phases requires expert decisions necessitating a varied set of skills and experience.

Development. The developmental phase of ISD consists of three major activities: operationalizing design strategies, formative tryout, and production.

Implementation. Implementation of a newly developed or revised instructional program has two requirements: (a) providing training for instructors and instructional managers and (b) conducting the actual instruction on students.

Evaluation. The evaluation phase is a broad-based, continuing activity which fine tunes each of the four previous phases. It is an ongoing, cyclic activity which measures and evaluates the output of each ISD activity.

The Phases Rarely Help the Designer Make Decisions

The five generic phases of ISD have become buzz words of instructional technology and often have idiosyncratic interpretations that may be dysfunctional to other designers. The phases are components of material development flowcharts that act as procedural guidelines, but rarely reach the point of specificity whereby they help the designer make decisions for student prescriptions. Student-prescriptive decisions are those in which the designer combines creativity, intuition, and past experience to juxtapose the principles of learning (arousal theory, reinforcement theory) to levels of learning (cognitive, affective, psychomotor) for a specific target population (age, IQ, demographic background) within a defined environmental training setting (large class, simulation, field conditions). The greater the creativity of the course designer in generating training strategies the more likely the success of the resulting course. ISD technology can be used to examine critically those creative ideas but rarely to generate them.

There are other limitations of ISD which should be exposed before practitioners move into the 1980's. These limitations, while important, do not negate the inherent strengths and value of ISD in the design and development of competency-based training, so long as its promise is not exaggerated. The staff resources, costs, political implementation problems, and required designer and instructor training are but a few of the limitations which should be known before an education department adopts an ISD approach. The recent phenomenon of schools, industry, and the military adopting the ISD approach makes possible a critical review of effectiveness of alternative approaches. There is little research evaluating alternative ISD approaches to student learning. ISD may not be the only answer to training needs. Other areas yet to be included in the ISD sphere of influence are: human development, human behavioral engineering, and student selection based upon aptitude treatment interaction. While recognizing the inherent strengths of ISD and its continued expansion into other human spheres of influence, future training planners will benefit from examining some of the apparent limitations of the ISD system to minimize those problems in the 1980's.

Limitations of ISD

The thousands of man-hours expended in the application of ISD have resulted in a reservoir of experiential wisdom which should be delineated. The listing and subsequent discussion of limitations should attune future developers to potential problems and save the organization time and resources. The limitations mentioned thus far in this paper now will be restated.
First, the ISD model was intended for training material development, thus ignoring the social variables such as attitudes, values, norms, and the cultural milieu which have an effect on training outcomes.

Second, most systems are situational to the training. Specifically, the management policies, staffing requirements, and diffusion strategies are three functions controlled by the organization that should be (but rarely are) represented in the overall training design.

Third, the front-end needs analysis, which typically validates problems requiring instruction, often ignores other solution strategies. These problems may be administratively solved through policy changes or may be solved through bureaucratic changes in organizational structure or they may be solved through training and instruction. Usually, the first is less expensive than, for example, staffing a training department. The needs analysis completed within the organization rarely examines the larger societal problems that influence the organization. A greater interface between the client group and the educational department early in the generation of educational curriculum or objectives will save countless hours of development time and student time. Simultaneously, the credibility of the instruction will improve.

Fourth, another organizationally related limitation is with the evaluation of the training. The typical ISD evaluation is conducted on the instructional materials or a course or other single entity and rarely are these courses or materials grouped together for evaluation. For example, in the military setting the evaluation may take place on a task, e.g., calibration of a tank turret system. The subset elements of training are usually not combined to systematically evaluate the overall effectiveness of the total organizational mission. This problem and the needs analysis problems (stated above) are similar to one another in that the ISD model rarely forces training designers to look outside the training system for alternative solutions to organizational needs.

The fifth limitation relates to the procedure of task analysis. This component has tremendous impact on development and training time because it is here that instructional value is assigned to content (facts, rules, and procedures). The task analysis breaks down the job into trainable components from which designers derive instructional strategies. What has been the typical case is that this analysis is being done from an "armchair" and not the field. Often what appears logical from an office point of view becomes unrealistic from the man-on-the-job point of view. This lack of realism for the job requirements is misdirecting training energies and is costly in terms of resources and program credibility. The typical task analysis involves structuring the procedural steps of the job, beginning with the hierarchical relationships and then preparing a format for sequencing and grouping conceptual ideas of the tasks into training segments. If, on the other hand, the ISD designer went to the subject matter expert and analyzed him on the job with interspersed interview questions for clarification, the designer would learn which elements of the task were more and/or less critical to the overall success of the job. The armchair approach does not know where to assign greater instructional time to the more critical elements of the task. Consequently, all task elements are treated equally, when in fact, the person in the field requires training that is matched to the criticality of certain subset functions in the job. For example, to administratively state that there is a 60 minutes time limit per segment of instruction ignores the concept that some job elements require 20 minutes while others require hours. Through observation designers learn emphasis; not all task elements demand the same training effort.

There is a series of other ISD related limitations that can influence the success of training departments. The sixth limitation addresses the practice of overgeneralizing the design and development phases of an ISD model. The major thrust of the proceduralized ISD movement has been to reduce the reliance on scare, expensive instructional technologists by developing course design manuals usable by personnel minimally grounded in instructional technology. The development of these manuals and algorithms which seek to model the decisionmaking processes assumes there are theories of learning and instruction which are refined well enough to permit formulation of course design rules. In addition, the assumption is that instructional technologists agree on such rules. Until those rules are discovered and validated each successful application of ISD will require an interdisciplinary team of subject matter experts and a competent instructional technologist. Directors of training departments must realize that while ISD methodologies are powerful, they only succeed as long as the instructional technologist adapts them to the training environment.

Limitation number seven relates to the issues just raised, i.e., adapting the ISD methods rather than adopting them. The variability found in training environments, i.e., student competencies, content, and time, are frequently unique enough to require the instructional designer to modify the ISD approach. The adapting process requires a great deal of creativity. At most, ISD can be a checklist and guide for helping ensure that course design errors are detected and excluded before course implementation. The greater the creativity of the designer in generating training ideas, the more likely the resulting course will be successful. ISD can be used to examine critically those ideas, but rarely to generate them. The background experience of the designer is of great influence in choosing adaptive strategies. In addition to experience, creativity can be enhanced if the managers of training departments encourage diversity and rule-questioning behaviors in their designers. Adapting an ISD manual should not be discouraged until the results (i.e., student performance data).

### Limitations of ISD

1. Social variables are not taken into account.
2. Most systems are situational to the training.
3. Other solution strategies are often ignored.
4. Courses and materials are evaluated as single entities rather than as interacting components of a larger whole.
5. Task analysis lacks realism.
6. The design and development phases of an ISD model are often overgeneralized.
7. ISD methods are often blindly adopted rather than creatively adapted.
8. There is too much reliance upon ISD developmental manuals.
are collected and analyzed. Professional competence grows with each adaptive method designed, i.e., creativity is encouraged as a person begins to understand that the external factors are controllable. Managers must set the norms for innovation in the training department. Student performance is the dependent variable of success, not following the lockstep procedures of an ISD model. Being trained in the psychological constructs of human learning and the successful alternatives available in meeting the training needs will encourage the designer to exert a creative approach. Adaptation should be the rule rather than the exception in the use of ISD models. Unfortunately, there are no rules for modifying the components typically found in these models. For this reason, it might be postulated that the processes used in adapting a generalizable ISD model to meet specific needs of varying training requirements and environments is an art rather than a science. This art may be learned best through a successful and monitored apprenticeship program, where the new designer learns to modify, synthesize, and aggregate real-world demands into a novel and very specific ISD model. If you will, a new model is generated to fit each new training environment. The interlocking of ISD designer training in theory and instructional technology to the changing demands of the real world will ensure available supplies of innovative competent designers in the 1980's. The last section of this paper will address itself to a hypothesized interlocking process.

The over-reliance on ISD developmental manuals is the eighth issue which might limit the future of ISD activities. Because the techniques and methodologies for training are rapidly changing, any dependence on an ISD manual diminishes the adaptive powers of the designer. The variable most related to dependency is experience. Therefore, to counteract this dependency and possible competency obsolescence, the managers of training departments must develop a reliable set of professional instructional designers who can match their real-world training needs to their continued professional development. The concept of interlocking emerges once again, and in this case the mechanism interlocking the real-world training needs to the latest validated technology is the professional designer in the field. In this instance, the personal needs of the designer match organizational needs in that, the training department has a cadre of professional instructional technologists who have in their repertoire the latest psychological and technologically skills necessary to meet the demands of a fast-changing world.

In addition, if the single model-manual is advocated there is the possibility that the designer will become indoctrinated to one manual's approach to design. There is no empirical evidence that there is one superior way to teach a skill or that one ISD model-manual is better than any other, so it becomes risky to adopt one manual over all others. The managers of training departments should base successful training development on student outcomes not on the procedures used by the designers.

During the last 20 years, the systems approach to instructional design has become the pre- eminent tool of instructional technology. As with any new tool, there are problems associated with the implementation and integration into the on-going training system. The eight limitations discussed thus far are meant to be refinements in our use of these models and perhaps a note of caution before a zeitgeist emerges that elevates an ISD model-manual over the creative good sense of a trained psychologist. One purpose of this paper is to suggest more realism in our ISD expectations.

"... the Gustafson and Silber debate raises important and valid issues that must be addressed by all instructional developers at one time or another."

Implications of Limitations for Instructional Development.

Instructional developers are often unable to profit from the efforts of their colleagues because it is difficult for them to describe their ID process unambiguously (Boutwell, 1978). Most often there is a systems model used that identifies the major guideposts signaling the sequence of common components found in their instruction. For persons not trained in human learning or the psychological constructs upon which instructional technology rests, the manuals and models were a short-cut to systematically designing instruction. The problems began to emerge as the variability of the training environment changed the nitch that systematic in-continues, certain industries may have to resort to raising salaries, offering bonuses, and hunting a field to attract needed technologists. Other solutions may be hiring less qualified people and relying on using a single manual.

If the promise of ISD is to be fulfilled we must return and examine our original goal. Silber stated the goal well in his article,

"... to provide effective, efficient, relevant instruction at a reasonable cost using a systematic process of designing, implementing, and evaluating the instruction, a process that is based on sound learning and instructional theory."

If the goal is still acceptable, we must train instructional developers and de-
Book Reviews

Two differing opinions of Gilbert's new book.

"Training is inherently good." Not only is training the most sought after solution to any problem, but its use as such is certainly part of the problem. Industrial training people contend with this problem daily. Training is extremely expensive. It solves only problems that arise from lack of knowledge; and seldom do knowledge deficiencies cause low production rates, lack of motivation, or other performance problems training is expected to solve. Gilbert, in his book Human Competence, finally synthesizes a systematic approach to identification, classification, cost/benefit analysis, evaluation, and determination of solutions to performance problems. Following this, Gilbert discusses resource development and implementation. The systematic approach presented by Gilbert warrants consideration for use in industrial training situations. It is the purpose of this review to generally describe the major concepts of the book and to evaluate it based upon Gilbert's stated objectives and audience, and a practitioner's view of its impact upon industrial training.

Human Competence consists of 11 chapters divided into four distinct sections totaling 176 pages, including an index and case history index. References and additional explanatory notes conclude each chapter providing some remediation. As he explains concepts, Gilbert uses case histories, charts, tables, and figures liberally. He combines these effectively with the text to lead the reader passively through realistic situations and provide examples and non-examples highlighting what is relevant to the phenomenon for study. His writing style is clear and entertaining. In general the book is well organized, and it is relatively easy to pick up to use as a reference.

The preface of the book clearly establishes the audience and objectives. The book is written primarily for managers in the world of work, educators and teachers, psychologists and other social scientists, and people in personnel-related professions. The book is clearly written for training professionals and appears far too complex for the ordinary industrial manager. The four major objectives are to define human competence, to provide a method for measuring competence, to provide a model for engineering human competence, and to translate the theoretical principles into step-by-step procedures. In terms of these objectives, Gilbert provides an excellent definition, method, and model for engineering human competence, but the translation of theoretical principles into step-by-step procedures is primarily left up to the reader.

Gilbert begins by naming his system of performance engineering "Teleonomics", which he defines as: "a particular system for studying, measuring, and engineering human competence." The phenomenon for study, then, is human competence. It begins by focusing on the results, or products, of behavior (and other events); it views behavior as only one of the inputs or causal variables.

Gilbert presents three major concepts underlying this approach: engineering, worthy performance, and accomplishment. As an engineer, the training practitioner determines the product required and uses any methodology or combination thereof to produce that product. An engineer does not look for new ways to solve problems but puts together old ways to provide solutions. Gilbert changes the function of the training practitioner to that of personnel manager by requiring him/her to combine the efforts of people from many, often unrelated fields to study, measure, and engineer human competence. Worthy performance takes into account two variables: value and cost. Here Gilbert begins to look at performance not only in the economic sense but also in a social context.

The very basis of this approach is the accomplishment. Very simply an ac-
accomplishment is the product, or result, of a series of behaviors. Gilbert emphasizes the difference between behavior and accomplishment repeatedly. In summary, then, the performance engineer looks at human competence as worthy performance whereby the valuable accomplishment exceeds the cost of its component behaviors.

In essence, Gilbert says to define the accomplishment, measure it, and then if the accomplishment is deficient, analyze its component behaviors. In proposing this, Gilbert expands the vantage point of the training practitioner mandating interaction at a higher level in the decisionmaking process. Training practitioners, if they accept this change, can no longer limit themselves to instructional solutions but must select from all possible resources, both human and mechanical, to build upon human competence.

Problem identification begins with the Performance Matrix and the ACORN test. Gilbert states, "We can view human accomplishments at several levels of generality, and the value we assign to these accomplishments at each level will be derived from the level just above." What Gilbert says is to begin analysis at the highest possible level and work down operationally defining each accomplishment model. As each is defined the ACORN test is applied. The ACORN test is five simple questions:

A: Is it an Accomplishment?
B: Does the assigned mission have Control over it?
C: Is it a true Overall Objective, or merely a subgoal?
D: Can this mission be Reconciled with the goals of the institution or is it incompatible with them?
E: Can a Number be put on it—can it be measured?

These questions are similar to those Mager proposes in his performance analysis model. Two things make this system significantly different from both Mager and the instructional design model. First, the Performance Matrix forces the practitioner to look at more than the learner level (lowest level) as a possible problem area. He demands that the performance engineer begin the process at least one level higher. Second, Gilbert forces the performance engineer to ask one more important question, "Can this mission be reconciled with the goals of the institution...?". Most professionals are concerned with this as an ethical principle, however, Gilbert formalizes the question into a specific step in the process. The accomplishment must be valuable and the performance worthy in both a social and economical sense before further action is considered.

As part of the Performance Matrix measures of opportunity are specified. Gilbert proposes the performance audit including the potential for improving performance (PIP) and the stake (economic value of the PIP). Gilbert's concept of the PIP is unique. The performance engineer identifies and measures each accomplishment defined in the Performance Matrix, and identifies the historically best performance, the exemplary performance. The PIP is the ratio between exemplary performance and the typical performance. The exemplary performance becomes the criterion measure. The unique thing here is that the criterion can no longer be an arbitrary 100 percent, but must be determined by the best possible performance. Gilbert also puts this process into an extremely positive mode by telling the performance engineer to look for potentials rather than problems. From the PIP, a stake, or economic value, is computed indicating the value of connecting the PIP. When the PIP and stake are high indicating good potential for improvement and economic gain, then further investigation using the behavior engineering model is warranted. At this point the performance engineer knows the results to be achieved and the benefit to be derived from achieving them. Specific performance deficiencies and possible solutions are determined by further analysis using Gilbert's Behavior Engineering Model. Using this model the performance engineer breaks the accomplishment down into its component behaviors. For each factor in the model a PIP, stake, and possible ACORN test should be done to analyze the potential and select the best possible solution. The identification, classification, cost/benefit analysis, and solution determination are now complete.

It is at this point that the role of the training practitioner changes. Gilbert's Behavior Engineering Model shows that training is only one of the possible solutions. The performance engineer must be able to bring together, either by design or utilization, a variety of resources to achieve the desired results. This is a personnel management function with political overtones that Gilbert does not propose a model for handling. Gilbert does synthesize possible solutions and organizes solutions in a social/economic context. Gilbert then designs resource design and in this case, he oversimplifies. He does this as an engineer providing little that is new. Human Competence was written from an engineer's vantage point. In it, Gilbert has taken a vast amount of knowledge and synthesized it into a systematic process to maximize human competence.

Gilbert's step-by-step procedures for the design of resources appear simplistic. Certainly more comprehensive systems for instructional design and management are available and used to a large extent. In terms of implementation, Gilbert's suggestions are valid, but often unrealistic at this time. In training departments, the current mission is to provide training. It is a difficult and slow process to change this mission, particularly in the eyes of clients. To present them with anything other than a training solution, even at a large dollar savings to them, is threatening and quite often destroys a perfectly good working relationship. Gilbert gives no practical ways to solve this problem. Nevertheless, the concept does reinforce what most training professionals have believed for a long time, and it encourages those of us in the field to continue struggling toward this end.

In terms of target population, the book is clearly written for training managers and practitioners. It appears far too complex for the ordinary industrial manager. Personally, I fail to comprehend why Gilbert felt it necessary to take offensive pot shots at his audience. However, most people I talked with seemed to enjoy the negative comments about the other guy and missed the ones taken at them.

In conclusion, Human Competence, is a good book. It provides a description of an excellent system for analyzing performance problems, it reinforces the beliefs of the majority of training professionals, and it is a useful reference for the training professional. Given the opportunity, I would make it required reading for educational technologists involved in industrial training.—Review by Gay E. Bruhn, training analyst, GTE-Automatic Electric, 505 Railroad Avenue, Tube A-1, Northlake, IL 60164.
Human Competence: Engineering Worthy Performance—the dream of every educator, trainer, and parent; an ambitious title for Thomas F. Gilbert's ambitious undertaking to "create a useful, simple, and coherent system for engineering more worthy performance in individuals and especially in groups of people" (p. 3). After creating this system Gilbert believed he must communicate his results to "individuals who make human competence their business...managers in the world of work: educators and teachers; psychologists and certain other social scientists; and an assortment of people in personnel-related professions, ranging from training directors to industrial engineers" (p. vi).

This review, from the point of view of an academician teaching instructional design to students who are or shortly will be responsible for developing instruction for learners, addresses the utility of Gilbert's book as a reference volume for students of instructional development.

Probably the strangest thing about Gilbert's volume is that he advocates, seemingly unknowingly, going through the "traditional" steps of the instructional development process; and he does so without using any of the traditional jargon associated with instructional development. This would be fine if Gilbert were addressing a population ignorant of that terminology and if that audience was not expected to use such a vocabulary in their everyday performance.

Instead, Gilbert develops his own vocabulary. Gilbert does need analysis to identify gaps (for problem identification), but Gilbert's gaps are called PIPs (potential for improving performance). Part of the PIP is derived from audience analysis, part from setting analysis, and part (often) from policy analysis. In combining these various analyses Gilbert has done both a service and a disservice: once one knows the rules, one can break them; however, following Gilbert's methods of analysis it appears to be very easy to misinterpret the PIP when attempting to identify the appropriate solution.

Yet Gilbert believes in the "total picture"; his methods of analysis do require the evaluator, assessor, or auditor to view everything related to the area being assessed plus some. Gilbert insists upon beginning the analysis one step above (in hierarchical terms) the level at which the apparent problem is manifested.

In retrospect, the book seems shallow. Gilbert does not pretend to have developed something new, only to have combined many old strategies into a single coherent system. For Gilbert, Gilbert has succeeded, for this reviewer, Gilbert has not, apparently, considered any of the newer (within the last 20 years) technologies, strategies, or systems that have been developed to accomplish the same ends as Gilbert is advocating. Using Gilbert's terminology, I agree with the accomplishment (the outcome of behaviors) but not the behaviors advocated by Gilbert.

One portion of Human Competence which makes the rather steep $16.95 a worthwhile investment for an academician is spread throughout the book. Gilbert has written or collected a series of excellent case studies. These case studies are often used to illustrate Gilbert's points (and it would not be a surprise to discover many of them are true experiences from Dr. Gilbert's respected background) but can easily be used in teaching as well as in testing. A very interesting exercise is to follow a thorough case study, such as is found on pages 349-370, and see if you (or your students) can identify the "steps" of whatever needs assessment model, instructional design model, you advocate. Although performed in an unorthodox (yet certainly appropriate, pragmatically, for Gilbert) manner, all the essential steps are there.

In summary, for beginners or beginning students in instructional design, Human Competence is probably not a worthwhile text. For advanced students there is value; a critical analysis of Gilbert's system will lead to a better understanding of the procedures often recommended by instructional designers; the case studies are jewels for use with students who should be able to identify examples of the use of needs assessment techniques as well as identify which steps of such assessment models were left out or combined with other steps.—

Review by John B. Johnson, director, Instructional Communications Center, Governors State University, Park Forest South, IL 60466.
A Problem of Tunnelvision?

I just received the first "open-to-the-world" issue of the *Journal of Instructional Development*. Congratulations! It is good. I liked what I read. I would, however, like to take a moment to point out a problem that I see. It is a problem of tunnelvision—whose, I don’t know. It may be the problem of the JID author and/or the editor. It may be the problem of the Division of Instructional Development or it may be the problem of AECT in general. I suspect this last.

I speak in particular of Kent Gustafsson’s article on the future of instructional development (JID 2:2). Let me first point out that I have known Kent for a long time and that I also understand the nature of the Silber/Gustafsson articles. They were (I assume) intended to illustrate extreme opposites for the future of instructional development and thereby stimulate dialogue. I laud the idea. However... (you knew there was a catch, didn’t you?)... Gustafsson cheated a bit. Kent casts the future of instructional development within the framework of educational institutions, especially formal education. He admittedly removes business, industry, and government from the instructional development movement. Thus, when he predicts failure for instructional development, he is really predicting a failure for education. While that may or may not be true (more about that later), it’s not sporting. I can envisage individual instructional developers and the field of instructional development proving its worth in areas other than the educational establishment. (This is the same problem AECT faces as a whole—it recruits only among educators,* and not from business and industry.) I do not see this as a failure. We may forget that many of the lessons of mass instruction through the use of media were developed by the other sectors—government, business, and industry—as much as they were by education.

I should also like to point out a possible difference between public and private higher education. The latter is more subject to the pressures of the marketplace than the former. Perhaps private universities will behave more like business, government, and industry than public institutions. I honestly do not know. I can look to my own school and see an awareness of the financial problems accompanying a goal of and reward system for productivity. Time will tell.

I know that there is in the private sector an increased awareness of the need for effective and efficient training.

I’d like to see Kent or someone else take another shot at the dark glass, this time without linking the field of instructional development so tightly to education. It would probably make a difference in the amount of pessimism. I can’t blame Kent, I would probably have taken the same tack. What can you do, Kent, with a more or less impossible assignment like that? Next time, make Silber take that side of the argument.

—Clinton J. Wallington
Chairperson, Dept. of Instructional Technology
Rochester Institute of Technology

*Doubts about the validity of this statement? Read in act where membership promotion is sent. Then, ask yourself why ASTD is approaching 15,000 and AECT is struggling to reach 9,000.*

Workshopping on Empty

I welcome the opportunity to respond to the letter by Clint Wallington commenting on my article portraying a dark future for ID (JID 2:1). His letter raises a number of interesting points which I will respond to specifically and then summarize at a more general level. But first let me say, I hope Clint’s letter is only the first of many concerning the articles by Silber and myself. They were intended to simulate dialogue on the future of ID and this, it is hoped, represents only the beginning. (How about some comments on Silber’s article!)

Concerning the matter of “cheating a bit” I would prefer to say I was hedging my bet by limiting the discussion to education. It seems to me there are some fundamental differences between education and industry which make it appropriate to examine them separately. Among these differences are the profit motive, a sense of competition, rapidly expanding technology, and the number of government regulations businesses and industry face. All these factors produce serious “push” on business/industry to provide more and better training. For example, product safety and worker safety are two of the primary motivations for business and industry to improve training. Maybe if education was required to assure the safety of its product, it would be more strongly motivated.

It also seems apparent that efficiency of training is of considerably greater importance in business/industry than in education. In fact one could argue that the relative amount of energy directed toward efficiency it must be a dirty word to educators.

Frankly, I don’t think the ID process has much of a future anywhere if it can’t speak to both effectiveness and efficiency. This also includes the private university Clint mentioned. Productivity as defined in education (usually as the number of student credit hours per full-time faculty) is at best a very limited measure of efficiency. I can put 100 students in a lecture hall instead of 50 and double my “productivity” without any ID input. To really deal with the issue of efficiency we need an entirely different economic model accounting for a variety of input, process, and output variables. And all the educators interested in applying such an efficiency model could hold a national convention in a phone booth.

So now we arrive back at the original question, “Does ID have a future?” My answer remains the same. ID as we currently teach it (and as we claim to practice it) has no future. Significant improvement of our skills and knowledge must occur or we will end up on display in the Smithsonian. We can change and grow as some of us will, and the viable elements of ID will survive. But like the over-ardent followers of the programed
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Manuscripts which do not conform to these guidelines will be returned to the author for revision.

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- Use plain white paper, standard letter size (8½ × 11 inches). Avoid easily erasable papers, slick papers that some copiers use, rag bond, onion-skin.
- Type a 6-inch line—72 characters elite, 60 characters pica. Type 25 lines to a page.
- Use plain type—no italics or script. To indicate italics, underline. Do not use italics for emphasis too often; if you do, the italics will lose their emphasis. Avoid unusual symbols and Greek letters, but if you must use them, type them if you can; if hand-written, identify the letters or symbols by writing out the name of the symbol.
  
  For example:

  ![Greek letter delta]

Style

- Use capital and lower case letters for the title and author bylines.
- Spell out the words Figure and Table. Use Arabic numerals to number figures and tables. Example: Table 1, Table 2, Figure 1, Figure 2.
- Spell out abbreviations and acronyms the first time they are used. This applies to commonly used abbreviations as well as to others. Exception: U.S. when used as an adjective (The U.S. economy, U.S. Office of Education). (USOE). JID may be used without spelling it out. Spell out the names of associations when first used. Example: American Library Association (ALA). AECT should be spelled out but need not be followed by the acronym; afterwards, the acronym may be used alone. Spell out the names of states in the text but use the two-letter state abbreviation with the zip code in addresses.
- Spell correctly. Follow American usage.

Writing

- Be clear. Say what you mean. Don't make the reader guess, even if it's easy. For example, take this shopworn example of poor writing: For Sale: Piano, by a woman with carved legs. Everyone knows it's the piano, not the woman, that has carved legs. That doesn't excuse sloppy writing.
- Use nonsexist language.
- Authors are encouraged to use the terminology in Educational Technology: Definition and Glossary of Terms published by AECT.

Parts of the Manuscript (in order)

- Cover page. Include the title of the manuscript and the full names of all authors. Also provide the title or position, organization or institution, complete mailing address including zip code, home and office telephone numbers, for each author. Indicate which author should receive editorial correspondence.
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