The Design of Instructional Materials

A Top-Down Approach

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Abstract. This article describes a new model for the analysis and development of instructional materials. This model is in the tradition of human performance engineering. The model combines behavioral and cognitive approaches in a single, systematic approach that has proven successful in a number of different applications. The key to the model lies in its top-down approach to problem analysis. The performance analyst begins by analyzing the overall performance situation, then moves to a general analysis of the appropriate behavioral sequence. After the behavioral sequence is identified, the analyst determines attitudinal and performance heuristics. Finally, the analyst describes or develops subject matter theories to support the use of the heuristics. The design and development process parallels the steps in a top-down task analysis and therefore results in an elegant and efficient developmental effort. The general steps of this approach are described and then illustrated by explaining how it was used to guide the design of an instructional package to teach bank officers how to sell financial services.

Overview

This article describes a new model that facilitates the effective design of instructional materials using a top-down approach. The model is based on the assumptions of instructional technologists who are working in the tradition of human performance engineering. The model combines behavioral and cognitive insights into a comprehensive approach that has been successfully tested in a number of practical applications.

Performance Engineering and Instructional Technology

The model described in this article is in the tradition of human performance engineering, as it has been propounded by Gilbert, 1962, 1978; Mager & Pipe, 1970; Harless, 1974; Rummler, 1976; Horn, 1976; Harmon, 1980b; and Bailey, 1982 (See Figure 1). This approach to instructional technology has its roots in Gilbert's work on Mathetics and is based on the following assumptions:

- Performance problems can be analyzed in terms of deficiencies in the environment, deficiencies in available feedback and consequences, deficiencies in management and overall task organization, and deficiencies in skill and knowledge. Instruction is only appropriate when one is dealing with skill and knowledge deficiencies.
- Experienced or master performers are available and their work can be studied.
- Instructional outcomes can be specified in terms of job outputs that can be measured in a real working environment.
- Trainees will be able to apply what they learn on a job soon after they complete the instructional program.
- Developmental testing can be done and the instructional materials can be revised until they produce the desired results.

Although other "disciplines" in instructional technology share some of these assumptions, they don't tend to be as concerned with them as the practitioners of human performance engineering are.

Educational technology, as defined by Gagne, 1977; Gagne and Briggs, 1974; Merrill, 1977; and Scandura, 1973, for example, seems to have developed its models and techniques primarily to facilitate the development of instructional materials to be used in school environments. Likewise, the military services have supported the development of a set of instructional models and techni-

ques, collectively known as ISD, that focus on the particular problems of military training. Recently a new "discipline" seems to have begun to form around the special problems involved in using computers to facilitate or administer instruction.

Human performance engineering, from its inception, has always focused primarily on the problems of business and industry. These problems range from training employees to perform very structured production-line jobs to educating managers to make reasonable decisions in very unstructured environments. Moreover, the problems of business and industry require that the performance analyst pay equal attention to the environmental, motivational, and instructional factors that impact employee performance to assure that training is only developed when it is likely to provide cost-effective solutions.

The model described in this article shows the common concerns of human performance analysts, but focuses primarily on the problems involved in the design of instructional programs.

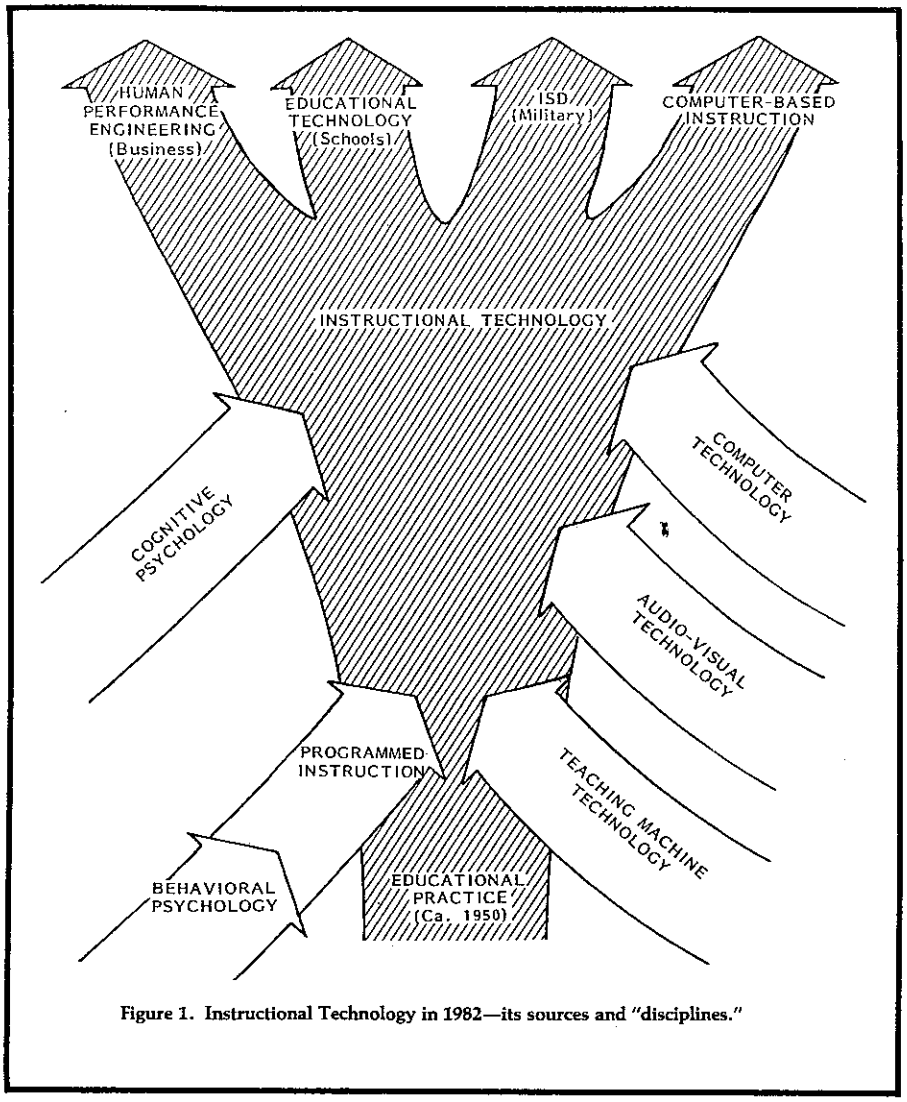

Figure 1. Instructional Technology in 1982—its sources and "disciplines."

The Basis of an Integrated Approach to Instructional Design

The dominant metaphor in psychology today is the human as a computer. By likening human thought to information processing, psychologists have sought to clarify the processes by which humans solve problems. Figure 2 presents a simplified model of how humans process information. The stimulus to the left of the box and the response to the right of the box are traditional variables of operant psychology. The box represents a person. Two major variables of cognitive psychology are indicated inside the box. Heuristics refer to the If-Then statements that an information processing system uses to analyze new data and select an appropriate response. Knowledge structures refer to the portion of an information processing system's memory that is activated or utilized when a particular stimulus is encountered. Notice that two variables impact a person's analysis of a situation: (1) the external stimuli and (2) the information from memory that is associated with that external stimuli. Further, people can take either of two actions. They can either (1) search their memory for more information to better analyze the situation, or (2) they can make an overt response.

In the language of computer science, heuristics (or algorithms, which are just very precise heuristics) are the imperative statements that comprise programs, while knowledge structures are the declarative information contained in the memory of the computer. (Some would say that a knowledge structure is analogous to just that portion of the memory that is available in the computer's active memory when the computer is working on a problem.)

By this analysis, preparing students for complex performance requires that we consider (1) the actual stimuli they will encounter, (2) the skilled responses they will be required to execute, (3) the heuristics they use to analyze situations and select responses, and (4) the structure and content of that portion of their memory that they use when thinking about the particular performance. The approach described in this article addresses these concerns by suggesting that instructional designers approach training problems by way of three successive levels of analysis. (See Figure 3.)

The first level of analysis involves determining the sequential behavioral steps that structure the overall performance. In preparing an analysis the designer begins by entering names for the behavioral steps, one after another, across the center of a page (Circle 1 in Figure 3). In effect, the words indicate stimuli and the connecting arrows signify the performer responses that result in subsequent stimulus situations.

Next, the designer describes the heuristics that the performer uses to determine or guide his or her response (Circle 2 in Figure 3). For practical purposes, it is useful to divide heuristics into two types: (1) procedural heuristics and (2) attitudinal heuristics. Procedural heuristics are those rules of thumb the performer uses to actually determine or guide specific actions. Procedural heuristics, for a salesperson, might include: "Get the prospect talking" and "End comments with 'checking questions' to be sure the prospect understands and agrees." Attitudinal heuristics are more abstract rules of thumb. In fact, they are

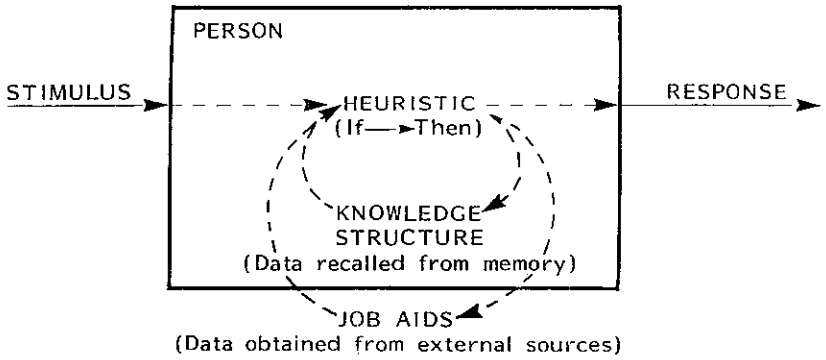

Figure 2. An overview of the major variables involved in complex human action. (This figure was suggested by Herbert A. Simon in a lecture given to the Stanford University Psychology Department, February 10, 1982.)

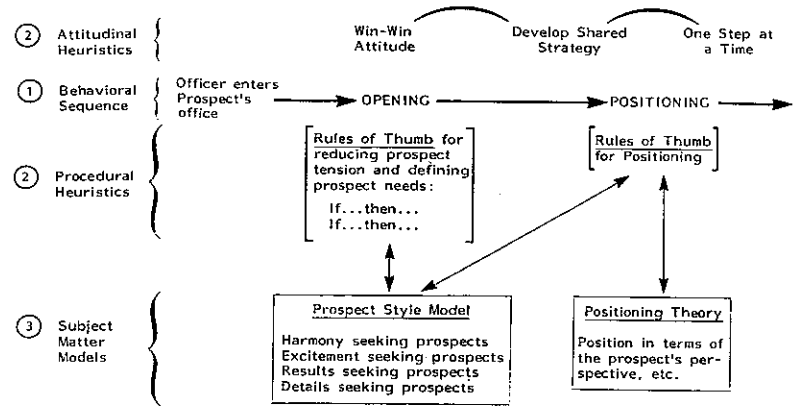

Figure 3. Three levels of task analysis necessary for instructional design.

often broad metaphors or rhetorical statements that the performer uses to structure his overall approach and conversation. Attitudinal heuristics, for a salesperson, might include: "Selling is a Win-Win process" and "It's important to keep talking about a sales as a process in which both parties win."

The third level of analysis involves identifying or creating the subject matter models that a performer uses when he or she thinks about the environmental stimuli and decides which heuristics should be employed (Circle 3 in Figure 3). Just as heuristics are rules of thumb that don't apply in all situations, subject matter models are simplifications of reality. They highlight the most important things to look for and the most likely events to anticipate.

Task analysis and instructional design both proceed in this top-down manner. First the overall behavioral sequence is documented. Then appropriate heuristics are identified. Finally, the specific subject matter necessary to facilitate the use of the heuristics is described or developed.

A General Procedure for Developing Instructional Materials

Figure 4 pictures the major steps involved in the development of instructional materials.

1. Overall Analysis of Problem.

This step has been called a Performance Audit (Rummler, 1976, Gilbert, 1978), a Front End Analysis (Harless, 1974), and a Needs Assessment (Kaufman & English, 1979). Whatever it's called, if it's done in a comprehensive way it results in a description of what constitutes mastery performance for some well specified situation.

The overall analysis of the problem should result in a description of the interaction between the performer and the environment in which the performer will act. In developing an overall analysis, we ask such questions as:

- What needs to be done and by whom?
- On what occasions does it need to be done?
- How will we know it's been done correctly?
- What are the differences between the best performers and average or typical performers?
- What constraints exist that will limit or dictate particular presentation strategies, media, etc.

The overall analysis doesn't describe the details of what needs to be done; it provides an overview of the occasions for performance, the activity to be performed, and the likely consequences of performance.

The main purpose of the overall analysis is to assure that one does not develop unnecessary instruction. Consider, for example, a request to train loan officers to make agricultural loans. Without an overall analysis, one might simply do a task analysis of all the behaviors that go into making agricultural loans and then proceed to teach the entire procedure. In effect, one would undertake a behavior task analysis without having first adequately defined the situation. An overall analysis would probably reveal that agricultural loans were sufficiently similar to commercial loans so that only a limited number of additional things would need to be taught. Further, studies of agricultural loan officers themselves might show that average performers and master performers only differed on a few specific behaviors. These considerations, combined with allowances for the role of motivation/incentive and environmental variables, and coupled with cost considerations, should define and focus the training before one begins to think about how to teach the specific behaviors that will need to be taught.

The overall analysis may also establish the cost-effectiveness of undertaking an instructional development effort. One of the most important professional obligations of human performance analysts is to recommend against a training effort when it is not likely to be cost-effective.

1-B. Recommend Environmental Changes.

The overall analysis will often indicate that changes in physical aspects of the work environment, the feedback/

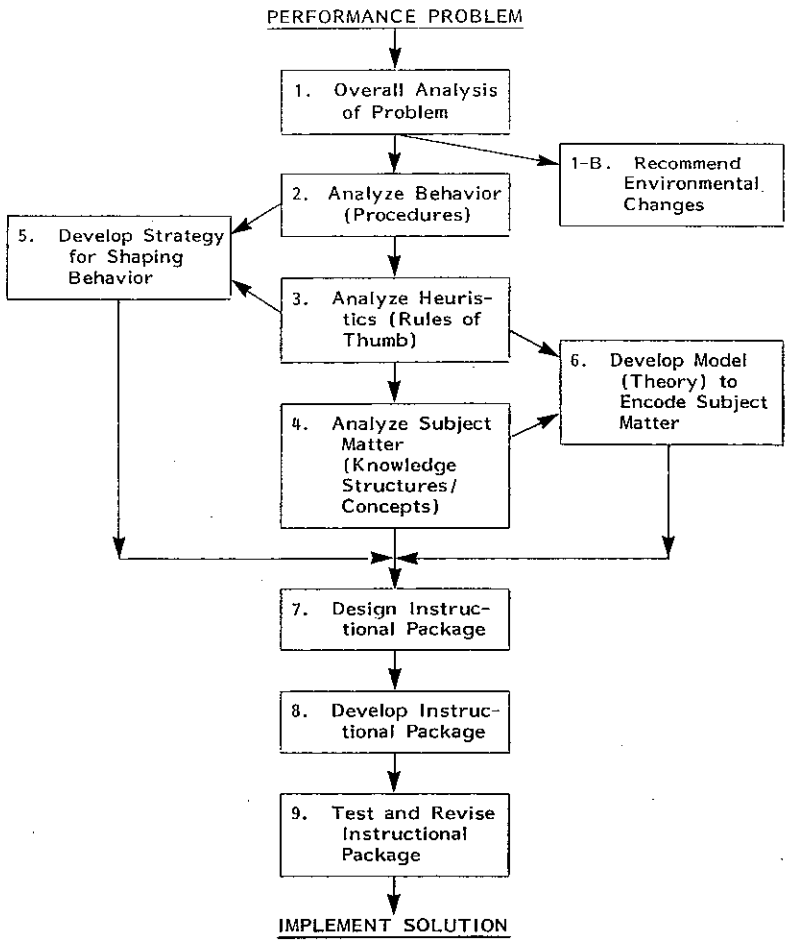

Figure 4. General Procedure for Developing Instructional Materials to Teach Complex Performance.

consequence system, or in supervision will improve performance. While such changes are not a direct concern of the instructional designer, they should be recommended. If they are implemented, they often lead to a more effective instructional design that is easier to implement.

2. Analyze Behavior (Procedures).

The analytic effort leading to a description of overt performer behavior is typically referred to as a task analysis. In fact, task analysis begins with the overall analysis of the problem and proceeds, step by step, throughout the developmental process being described. The advantage of a top-down task analysis is that one doesn't go into greater detail than one is forced to by the particular problem being analyzed (Harmon, in press). The objective of step 2 is to define the overall procedure and the specific behaviors that the student is to master. A good analysis emphasizes how the student will respond to all of the typical stimuli he or she is likely to encounter on the job. The behavior should initially be described in terms of large steps, each of which should be clearly observable when actual performers do their jobs. As necessary, the analysis can include more specific behaviors.

In analyzing behavior, the performance analyst asks such questions as:

- Exactly what will the student need to do to exhibit mastery?
- What are the overt steps the student must perform? Exactly what skills are involved in performing each step?
- Which behaviors are already in the student's repertoire and which will have to be taught?

The behavioral analysis usually results in a step by step procedure that provides the backbone for organizing the instructional design effort.

3. Analyze Heuristics (Rules of Thumb)

Once the performance analyst has identified the sequence of behaviors that typify a task, each step can be analyzed to determine what heuristics guide the skilled or master performer when he or she decides to undertake that specific behavior at that point in the task. This analysis, often coupled with an analysis of the subject matter to be taught, is often referred to as a cognitive task analysis (Cf. Greeno, 1980).

If the analyst represents the behavioral sequence as a decision flowplan, each branch point on the flowchart requires a decision. If the decisions are complex, the procedural heuristics will necessarily be more general and open-ended. If the decisions are specific enough, an algorithm can be developed. An algorithm is simply a heuristic that is so specific that it guarantees the correct outcome whenever it can appropriately be applied. Most heuristics only guarantee outcomes in terms of probabilities, and the analysis will frequently need to specify that several different heuristics should be applied in combination to assure a reasonably high probability of a successful outcome.

Attitudinal heuristics usually take the form of general propositions, metaphors, or rationalizations for an overall course of action. In some cases the performer states the attitudinal heuristic to him or herself to prompt more specific statements or actions. In other cases, the performer states the attitudinal heuristics in public to explain why he or she will be undertaking a specific course of action. In negotiating, for example, it's useful to publicly state that one is seeking to negotiate a deal that both parties can live with, and to subsequently identify how specific actions do or do not correspond with that goal.

In analyzing heuristics, the instructional designer asks such questions as:

- What decisions does the performer need to make at each step?
- What rules of thumb do experienced performers use to help them make those decisions?
- Which rules of thumb are more salient and under what circumstances?
- What sorts of general rhetorical statements do master performers make? Do the statements tie together into a general metaphor?
- Can we develop very specific heuristics (algorithms) to describe the correct response at each step, or must we rely on more general heuristics or on some mix of general heuristics and algorithms?

The heuristic analysis usually results in the identification of a number of procedural rules of thumb and a few propositions. Heuristics define the thought processes the performer must go through when he or she analyzes a problem and decides on a course of action.

4. Analyze Subject Matter (Knowledge Structures/Concepts).

Once one has identified the heuristics used to perform a particular task, one then proceeds to identify any body of declarative knowledge that the performer must access whenever he or she wants to apply a particular heuristic. If, for example, one identifies a heuristic that states: "To qualify as a prospect, the business should have a current ratio of at least 1.8 to 1," one can logically determine that to be able to use that heuristic, the trainee must either already know or be taught about "current assets," "current liabilities," and that the "current ratio equals current assets divided by current liabilities." More broadly, the trainee must understand those basic financial models of a business that are called financial statements.

To analyze the subject matter or knowledge structure required to perform a particular task, one describes all of the definitions, discriminations, generalizations, patterns of interrelationships and logical transformations that the performer must understand in order to be able to effectively use the heuristics identified in step 3. Cost-effective instructional design requires that the analyst carefully review each heuristic to assure that any terms or concepts implicit in that heuristic are explicitly defined in a subject matter model. Subject matter not implicit in the heuristics, of course, should be strictly avoided.

5. Develop Strategy for Shaping Behavior.

Once one has identified the overt behaviors and the heuristics to be taught, one must decide on a strategy to get the students from their present repertoire to the desired repertoire.

In order to develop a strategy for shaping behavior, the designer must ask questions like these:

- Can behavior modeling be used to demonstrate the overt performance?
- Does the student need to memorize particular behavioral sequences, heuristics, or subject matter models, or can they be prompted by means of job aids?
- What skill or knowledge must be taught first? How long must these be practiced before additional skills or knowledge is introduced?
- What will criterion performance consist of? How closely can we stimulate the ultimate performance situation?
- What general pattern of successive approximations can be used to introduce behaviors, integrate them together, and finally provide the students with a sufficient variety of practice in performing the ultimate mastery task(s)?

6. Develop Model (Theory) to Encode Subject Matter.

After one has analyzed the heuristics and determined the subject matter that must be taught, one must decide how to present it to the student. If the subject matter is at all complex, the subject matter should be organized into one or more subject matter models.

> "This model combines behavioral and cognitive approaches in a single, systematic approach that has proven successful."

A model is a simplification of reality; it is a representation in which some amount of detail has been omitted. Models can either be physical representations, like an architect's small model of a proposed building, or symbolic representations, like the architect's blueprints of a building. In either case, the model is expected to commmunicate information about the elements or the pattern of an object, event, or situation without being as complex as the real thing. At their best, models allow their users to examine a situation and make predictions about it before actually becoming involved in the situation itself.

Subject matter models are sometimes called domain theories (Gilbert, 1962) or epitomes (Merrill, 1977). Scandura (1973) and others in the developmental tradition have argued that the creation of this core model of a subject matter is the main function of instructional design.

The subject matter model describes the key elements and the relationships that master performers typically consider when they analyze a situation. A good subject matter model modifies the way a student conceptualizes the environment. The key thing about subject matter models is that they do *not* describe action; they are structural, rather than functional. They provide performers with a way to describe and analyze the situation they find themselves in and to predict what might happen next. Subject matter models may be encoded onto paper, etc., but more frequently they are in the memory of the master performer and simply serve to guide his or her covert classification and decision making. One of the main functions of instructional developers is to make subject matter models explicit and therefore easily available to a new trainee.

Subject matter models are composed of declarative statements. They define, relate, and establish the rules that describe how the subject matter can be manipulated. The source of subject matter models is usually a language or symbol system. Math, welding diagrams, blueprints, dance notation, and musical scores are all examples of symbol systems that embody implicit subject matter models. Music notation, for example, does not tell one how to compose. The composer must learn music notation before he or she can compose. And, in the process of learning the notation, the would-be composer learns the conponents of the subject matter, tones, scales, and how these elements can be extended and sequenced in time.

Musical notation is analogical. One can tell by glancing at a score that some notes are of higher pitch or that they come after others in time. Math, on the other hand, is a digital notation system. There is no obvious relationship between the symbols comprising a mathematical formula and the physical elements or events that the formula is meant to describe. As a rule, an analogical notation system is simpler to grasp and use than a digital notation system. More complex subjects sometimes require digital notation, but even in these cases, instructional technologists should try to develop an analogical system to use when first in-

troducing the subject.

In developing a subject matter model, we ask such questions as:

- Exactly what subject matter does the student need to know in order to perform?
- What are the elements and the transformations that the student must be able to identify and anticipate?
- What is the general pattern or patterns that the elements take?
- What notation system do experts use to describe the subject matter?
- What are the elements and transformations that the notation system is designed to record?
- When do the performer's heuristics require that the performer consult his or her memory?
- Does the model describe a largely static situation or does it seek to portray a dynamic situation?
- Is the subject matter essentially concrete or formal? Are the students primarily concrete or formal operators? (Harmon & King, 1979).
- Can the subject matter be described with an analogical notation system (i.e., pictures or graphic notation)?

To analyze a subject matter, the instructional designer must often interview master performers or subject matter experts several times until all of the key components and relationships in their models or notation systems are clearly established.

All possible transformations and the boundaries or limits of the subject matter must also be identified. Once the instructional designer has determined the overall subject matter, he or she must clump and reclump the components until a simple model of from three to five elements results. This simple model is ideal for introducing a new subject matter because it respects the information processing capacity of human active memory which seems to be able to handle about four chunks at a time. The simple model should be able to display all of the critical patterns and transformations to be taught. This simple model is the domain theory or the epitome. It is taught first and then developed, by stages, into a more complex subject matter model (Cf. Simon, 1979, and Van Lehn, et al., 1980).

If one wanted to teach loan officers about financial statements, for example, one would want to begin with an explanation that was limited to 2 to 5 major concepts. Thus, one could begin by saying that a Balance Sheet was comprised of entries organized under three categories: Assets, Liabilities, and Owner Equity. One would proceed to define and relate these three terms before going into any details about the specific items that make up assets, etc.

The presentation of a subject matter model is usually a three step process which begins with the presentation of a familiar analogy that displays the essential pattern found in the subject matter model. Then the initial analogy is refined to include all relevant details of the ultimate subject matter model. Finally, exercises are provided to teach the student to "see" the real situations in terms of the subject matter model. (See Figure 5.) Thus, as the instructional designer develops and refines the subject matter model, he or she must simultaneously be seeking simple, commonplace analogies to the subject matter model that will facilitate introducing the student to the subject matter. Graphics and audiovisual treatments are often especially effective ways to encode, introduce, and develop subject matter models.

7. Design Instructional Package.

The final instructional design combines the strategy for encoding subject matter with the strategy for shaping behavior. Several approaches for combining the components together into a well organized instructional package have been suggested (Gagne and Briggs, 1974; Gilbert, 1978; Horn, 1976). In essence, an overview and a subject matter model are presented first. As appropriate, the subject matter model is elaborated and followed by practice in analyzing specific situations and making overt responses.

8. Develop Instructional Package.

The actual development of the instructional package may involve writing textual materials, preparing job aids, developing audiovisual materials, scripting presenter's lectures, or a host of related tasks which we will not pursue in this article.

9. Test and Revise Instructional Package.

The instructional package should be given a trial and then revised as necessary. An instructional package can almost always be improved once the designer sees how real students react during instruction or how they perform as a result of the instruction.

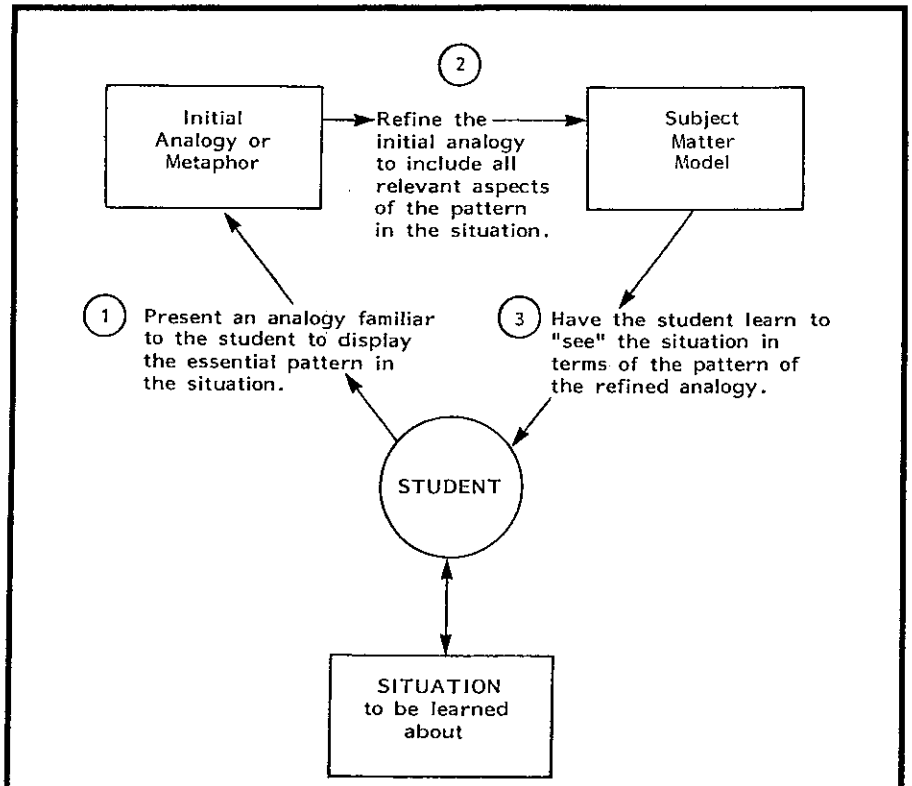

Figure 5. The Development of a Subject Matter Model (Harmon, 1980)

This brief overview of instructional analysis and development makes the design of instructional materials seem more logical and sequential than it actually is. Often one step reveals problems that require reconsideration of several previous steps. In a complex project, the designer typically moves back and forth among the steps. The general progression, however, is more or less as it is pictured in Figure 4.

Educators sometimes focus exclusively on the development of subject matter models while ignoring considerations of how someone might actually use declarative knowledge of a particular subject matter outside the classroom. Trainers, on the other hand, occasionally focus so exclusively on specific, overt behaviors to be taught that they neglect to give the student sufficient grounding in subject matter or theory to facilitate generalization. And both educators and trainers often ignore the analysis of the heuristics used by master performers. It is the heuristics that ultimately link and coordinate both the behavioral and subject matter components into an effective instructional program.

The remainder of this article will discuss the analysis and development of an instructional package designed to teach bank officers how to sell financial services. This example illustrates the application of the procedures discussed in this section.

An Example: Cross Selling Financial Services

The application of this approach to the analysis and design of an instructional system is illustrated by a recent project undertaken to design a sales course for a bank. The bank wanted to train individuals sitting at desks in branch office lobbies to sell financial services to customers who approach their desks. The individuals are called platform officers. In some cases they were already "selling" new checking or savings accounts to customers who entered the branch. The bank wanted them to become more sales oriented and sell additional services to new customers and to customers who were already doing some business at their branch office.

In bank jargon, selling additional services to existing customers is termed "cross selling." Investigation determined that most platform officers working for the client institution had not had sales training. Some of the officers did a very good job of cross selling services, while others sold no services at all. We proceeded to interview those officers whom the institution identified as doing an outstanding job of cross selling (master performers) to determine what sorts of things they were doing and when they did them. Based on these interviews, we determined that there were, in fact, two different occasions on which cross sales typically occurred.

In one case, an individual approached the officer and asked about a particular financial service. In this case, the officer proceeded to try to sell the individual that particular service and would then bring up other services that might also be of use to that individual.

Another approach would have proposed a sales course that was tailored for platform selling. A third possibility was to tailor a sales course for platform selling that would incorporate practice in selling the specific financial services the bank wanted to sell. In this particular case, we elected the latter course since by offering very specific training we could minimize the problems associated with generalization and transfer, and assure that the officers learned both product knowledge (subject matter) and sales skills (behaviors and heuristics) in the most coordinated and efficient manner.

"The main purpose of the overall analysis is to assure that one does not develop unnecessary instruction."

The second situation occurred when an individual approached an officer with a complaint or a question. Most officers simply answered the question or dealt with the complaint as best they could and did not see the occasion as a sales opportunity. The best officers, however, typically answered questions and dealt with complaints by seeking opportunities to offer new services to the individual which would eliminate the complaints. Then the officer would proceed to cross sell any additional services deemed appropriate.

In addition to investigating the platform officers and the sales opportunities they encountered, we considered environmental, feedback/consequence, and supervision factors that impacted branch sales. The bank had recently installed an incentive system that provided feedback and rewards to platform officers who made sales. The resources for selling were available. Many branch managers, however, failed to pay sufficient attention to the platform officer's sales efforts so it was recommended that a course be provided to teach branch managers how to coach and reinforce sales efforts. The bank took this recommendation. Thus, the remaining effort could focus entirely on providing the officers with the skill and knowledge required to make them more effective at selling.

One approach would have been to offer the institution a generic sales course.

Time and cost constraints established by the financial institution led us to select a presenter-led workshop as the appropriate method to present this course and to utilize flipcharts and blackboard illustrations in place of more elaborate audio-visual presentations. On the other hand, since our audience was not very sophisticated in sales, we elected to use videotape to show modeled examples of each of the skills to be taught. To maintain the specific product focus desired, we scripted and videotaped each of the typical officer-customer interactions that led to cross sales.

When our overall analysis of the problem was completed, we proceeded to identify the overall behavior sequence that described a typical sale. Then we turned our attention to the specific behaviors and heuristics used by those platform officers designated by the bank as master performers.

The procedural heuristics were of two general sorts. One set of heuristics was employed to determine which questions to ask in order to qualify or disqualify a customer for a particular service. The other set of performance heuristics were involved in determining how to explain and sell services to different types of customers. In other words, one set of heuristics depended upon a subject matter model that classified the financial products of the bank, while the other set of heuristics was activated by a subject

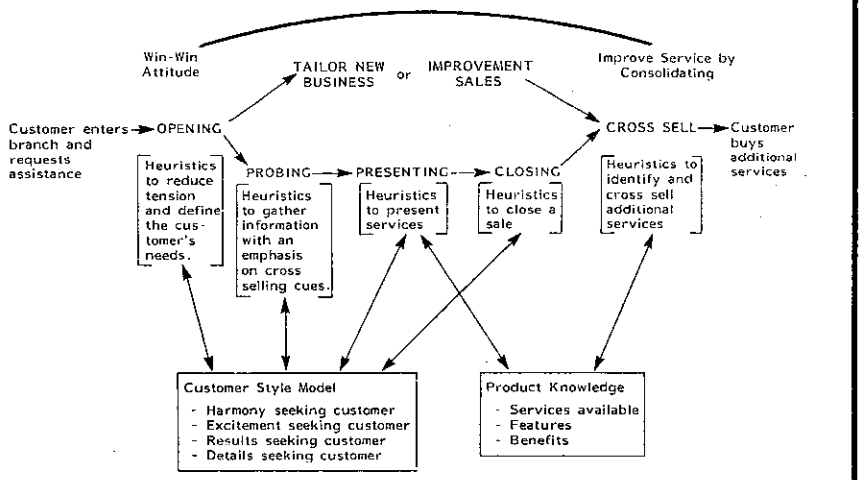

Figure 6. Overview of an analysis of a course to teach bank officers to cross sell financial services in their branches.

matter model that identified successful ways of communicating with different types of customers.

To develop the trainees' familiarity with the overall behavioral model as rapidly as possible, we developed videotape "models" of the appropriate behavior. Since the number of potential customer/service interactions and the qualifying questions were really quite limited, we were able to "script" most of the important interaction sequences the platform officers would have to learn. Role play scripts were developed to cover the same interactional sequences. Thus, students were able to watch videotapes of the correct behavior, discuss how the platform officers in the model integrated specific services with prospect requests, and then role play handling similar situations by themselves. Interaction checklists were developed to document key steps in the sales interaction. Each role play interaction was monitored by a student using an interaction checklist. Thus, each student developed a feeling for the overall sales model, not only by watching video modeling, but also by watching other students participate in the role play sessions.

Obviously, a field sales situation, or a more complex line of services, would have required a more complex analysis. The behavior modeling and role play exercises, for example, would have had to focus on a smaller sub-set of the possible sales interactions. We would also have had to consider how well particular exercises would generalize to numerous other possible sales interactions.

As noted earlier, we identified two potential subject matter models for financial sales. One subject matter concerned the services or products themselves, including the features and benefits of the services and how they compare with competitive products. The other potential subject matter involved classifying customers and predicting what sorts of techniques would be most appropriate with each type of customer.

The information regarding the financial services was already available in a poorly organized book called the *Service Guide*. It listed each department in the bank and described the services administered by that department. The development of a good model required that we rearrange the information into a stimulus-reponse format. We then grouped all similar stimuli and developed a model that looked like a branching-tree diagram. Once a customer mentioned a particular need the platform officer would know what questions to ask to determine each of the different services that might be offered to satisfy one or another aspect of that need. To reduce memorization to a minimum, the product information, appropriate qualifying questions, and cues to possible cross sales were printed on a small flipchart that each platform officer could keep on his or her desk. We integrated the use of the flipchart into the behavior sequence and also showed the flipchart being used in the videotaped models. This was sufficient to teach the platform officers how to actively use the "Services Flipchart" during their sales interactions.

A second subject matter model was developed to help platform officers classify customers and predict what sort of specific sales techniques would be most appropriate with each type of customer. We considered several different personality and communication models that seemed likely to make platform officers a little more sensitive to the different types of customers with whom they might interact. We selected a matrix model that described four generic prospect styles. The model was simple enough that we could teach it in the time required, and it generated enough inter-customer discrimination that we felt its use would significantly increase the variety of techniques the typical platform officer would use with prospective customers.

We later combined the customer style model with three steps in the behavior selling model: probe, present, and close, and taught the students to modify each step according to the style of the customer with whom they were interacting (e.g., How to ask questions to an excitement seeking customer, How to make presentations to a details seeking customer, etc.) We used videotaped sales sequences and group exercises to teach the students to discriminate customer styles and shift their sales approach in an appropriate manner.

The customer style model was only introduced after the students had mastered the general sales model so as to not overload the subject matter content of the initial presentations. Later the students were taught specific modifications in each step that would tailor that step for a specific customer style. Students then role played sales in which they modified their approach for different types of customers. It helped, in this case, that the sales environment and the services being offered were limited. This allowed us to provide each student with step-by-step behavior interaction scripts (procedures) and considerable practice in working through those scripts.

As indicated in Figure 6, we combined the behavior sequence and the subject matter models into a general "sales model" that we used to provide an overview of the course. The product knowledge flipchart was integrated into this overall procedural description of the instructional program. The customer style model was introduced later in the program and led to the development of four different ways of actually handling the procedures, depending upon the cus-

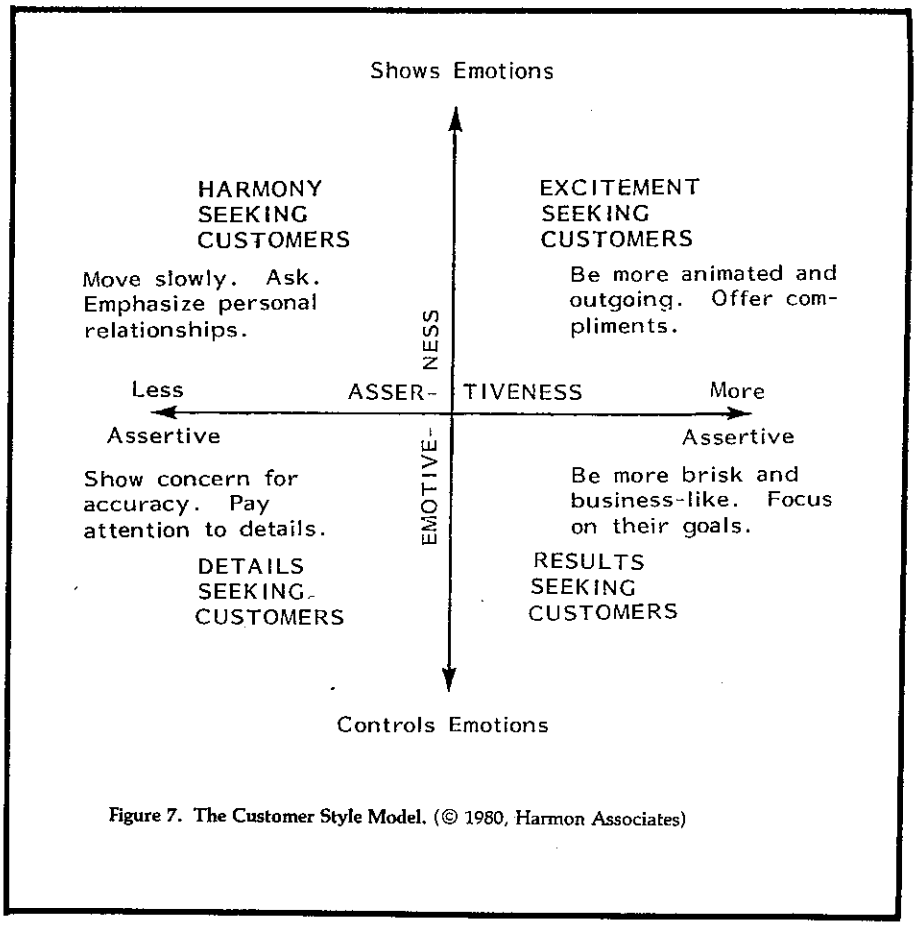

Figure 7. The Customer Style Model. (© 1980, Harmon Associates)

tomer being served. The entire program was tested and revised until it produced platform officers who could effectively obtain the cross sales the bank desired. The bank is currently using this course to train all its new platform officers.

Summary

This article has described a general model for the analysis and design of instructional materials. The overall approach works in a top-down fashion. It begins with a determination of the exact nature of the instructional problem. Then the overall behavioral sequence is identified. Each behavioral step is subsequently studied to determine exactly what heuristics the performer will need to use to determine how to proceed beyond that step. Finally, the heuristics are reviewed and the subject matter necessary to support the heuristics is identified.

Once all of the skill/knowledge components are identified, strategies are developed that effectively package the subject matter as one or more models. Then the designer orders the entire instructional effort in a manner that will smoothly and effectively shape the trainee's behavior toward mastery.

Some instructional technologists are expert at designing instruction based on a behavioral analysis or on an analysis of a subject matter. The master performance analyst, however, must be able to analyze all of the successive levels of a performance situation, synthesize models that will communicate the key elements of appropriate subject matter, and then integrate the resulting models with practice in the use of heuristics and specific behaviors to create an effective instructional experience.

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