INSTRUCTIONAL TECHNOLOGY: FOUNDATIONS

edited by

Robert M. Gagné
Florida State University

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16 Factors Affecting Utilization

Ernest Burkman
Florida State University

Do you want to see an instructional designer wince? Just ask to be shown a situation in which one of his or her design products is working as planned within an organization. Such a request almost always results in a blank stare or an evasive response. Standard evasive responses include giving a list of the constraints that prevented superior efforts from being implemented, gnashing of teeth over the incompetence of the people on the firing line that sabotaged some really noble project, or passing along a dusty example of a 10-year-old product along with a tale about how well it worked before being abandoned.

It is widely believed that the most critical problem facing instructional designers is to find ways to get their products off the drawing board and into use (Butler, 1982). Many designers have become very good indeed at spelling out models for designing instruction (Andrews & Goodson, 1980), and some have been able to produce instructional programs that work well under specified conditions. But, as has been recently documented by Back and McCombs (1984) and others, the instructional design (ID) process often breaks down when designers try to get their products properly used by others who must operate under real-world conditions and who may not share the designer's point of view.

The failure of practitioners to implement ID's products has not been confined to any particular setting. The problem is probably most severe for designers who try to influence instruction in primary and secondary schools (Berman & McLaughlin, 1974, 1977, 1978) but it is also well known in colleges and universities (Centra, 1976; Dressel, 1982). Even in military and industrial training settings, where it might be expected that the command structure would permit the use of ID products to be mandated, many utilization problems have developed (Branson, 1981; Miles 1983). All in all, the implementation record for ID has not been good.

Why has it been so difficult for designers to get their products into practice? What can they do to improve their success? This chapter deals with these two questions. Its thesis is that utilization can be improved if designers will systematically design their products to be user friendly and will see to it that instructors and other users receive the follow-up support that they require. To develop this thesis, we will draw heavily upon experience from fields outside of ID. Most especially, we will use generic concepts and models proposed by Rogers (1983) regarding the communication and dissemination of innovations and specific suggestions by Urban and Hauser (1980) regarding the development of new commercial products for the market.

The chapter has four major sections. The first section will sharpen the utilization problem and introduce some key concepts and terms. The second section will describe the standard approach to getting instructional designers' products into use. Then we will describe an alternative approach—user-oriented instructional development (UOID). The final section will briefly discuss some of the issues related to implementing UOID.

THE ID UTILIZATION PROBLEM

Introduction

Instructional designers' problems in getting their products used are by no means unique. They are shared by just about anyone who uses the research–development–diffusion (RDD) paradigm for solving social problems. This approach involves having experts identify problems and then systematically designing products, which are then turned over to others to be used to solve the problem at hand (Havelock, 1973). However, whether the problem involves introducing new medical and agricultural practices into underdeveloped countries, or getting sophisticated business executives to use personal computers, people who have tried to introduce predeveloped innovations have almost invariably encountered resistance from potential users.

It has been suggested that the only way to avoid the problems with getting innovations like ID into practice is to replace the RDD paradigm with a more user-oriented approach (Guba & Clark, 1974). One proposed alternative is a sort of problem-solving paradigm in which problem identification is left to people on the firing line, who then develop their own solutions (Lippett, Watson, & Westley, 1958). The problem-solving paradigm assumes that the feeling of ownership fostered by local generation of solutions will ensure their adoption. R&D products fit into the problem-solving model only if they happen to be chosen by firing-line people as solutions to problems

that they have identified. A primary criticism of this model is that firing-line people are often not technically equipped to come up with quality solutions and often do not have the time or inclination to do so (Havelock, 1973).

Almost by definition most instructional designers are engaged in work that is encompassed by the RDD paradigm. With this in mind, we will deal with their utilization problems within that framework. As will be evident, the power of ownership in stimulating adoption is impressive. However, we will try to posit a way to achieve a feeling of ownership among potential users without sacrificing the advantages gained by having ID products systematically designed by experts.

The Innovation-Decision Process

For purposes of this chapter, individuals or other decision making units that might logically use an innovative instructional program will be referred to as *potential adopters.* And it will be assumed that most potential adopters go through the five-step process proposed by Rogers (1983) as they pass from first knowledge of such a program to full use of it. This model has been widely adopted and is fairly typical of the way diffusion scholars presently view the innovation-decision process. Briefly described, the steps in the Rogers model are as follows:

1. At the *knowledge* step the potential adopter becomes aware of the program and gets a rough idea of how it works or what it does.

2. At the *persuasion* step the potential adopter seeks more detailed information and forms a favorable or unfavorable attitude toward the program.

3. *Decision* occurs when the potential adopter carries out activities that lead to a choice to adopt or reject the program. *Adopt* means to decide to make full use of the program. *Reject* means to decide not to adopt or not to consider adoption.

4. At the *implementation* stage the adopter puts the program into use. This is also referred to as *implementing the program.*

5. *Confirmation* occurs when the adopter collects information to confirm the adoption decision. Positive information leads to continuance of the program. Negative information leads to discontinuance or reinvention (modification) of it.

It will be assumed that the big problem that an instructional designer faces in trying to get products into practice is finding ways to optimize the chances that the outcome of each of the five steps is favorable. And it will be posited that this result depends primarily on two actions. First, designers' products must be designed to include attributes that are perceived favorably by the potential adopter; and second, the right kind of information and support must reach the potential adopter at the right time.

Instructional Designers and the ID Process

Part of the reason for the apparent failure of instructional designers to get their products adopted and implemented properly is semantic. Not everyone means the same thing when using terms like "instructional designer" and "ID product" or when stating that ID products are not being used properly. In fact it sometimes appears that every designer has a unique model for designing instruction (Andrews & Goodson, 1980).

To avoid parochialism we will define an instructional designer in fairly broad terms as anyone who meets the three following criteria:

1. An instructional designer's principal objective is to induce targeted learners to perform in prespecified ways. Normally the first steps in the ID process are to prepare specific learning objectives and to establish criteria for measuring their accomplishment.

2. Instructional designers achieve results by developing and implementing documented and replicable procedures for organizing the conditions for learning. Normally the procedures are incorporated into instructional programs that include instructional materials for use by learners and directions for use of the materials.

3. Instructional designers define and measure their accomplishments in terms of learner performance. Normally performance measures of the learning objectives are prepared and testing results are used to guide the ID process and to document the effectiveness of the final product.

This definition for instructional designers implies a comparable fairly broad way of conceptualizing the instructional design process. We will consider ID to be any procedure for improving instruction that includes: (a) prespecification of learning outcomes in performance terms, (b) development and dissemination of documented and replicable procedures for organizing the conditions of learning, and (c) evaluation in terms of learner performance criteria.

The definition for an instructional designer also helps to detail the nature of the products that designers generate and try to get into use. The principal product for most designers is instructional materials that incorporate learning objectives, procedures for organizing the conditions of learning, and measuring devices for evaluating student performance. Designers who produce such a product will be referred to as *materials developers* and their products will be called *materials*. Materials developers tend to think of valid implementation of their products as a two-step process. First, their validated materials must be used in the way that was intended, and second, the targeted learners must learn to perform as specified.

Some designers are one step removed from materials development. Their product is a model that spells out how to generate learning objectives, measuring devices and instructional procedures. This type of designer will be referred to as a *model builder*. For most model builders good utilization is a three-step process. First, someone other than the designer must use the model as intended to generate explicit objectives, validated tests, and instructional materials. Next, the materials must be used as intended with learners. Third, and finally, the targeted learners must learn to perform as specified.

We will tend to focus on the adoption and implementation problems of materials developers and will pay less attention to those of model builders. There are two reasons for this. First, the distinction between the two is somewhat artificial because model builders often participate in the subsequent development and dissemination of materials. And second, experience suggests that most potential adopters react much more favorably to concrete products than they do to abstract models (Brickell, 1971). Furthermore, there is evidence that the dissemination of models almost invariably fails because of wide variations in the way users interpret and use them (Farrar, DeSanctis, & Cohen, 1980). This suggests that model builders who are interested in seeing ID implemented with reasonable fidelity might consider taking the next step and developing appropriate materials for dissemination.

Variations in ID Tasks

Within the broad definitions given previously, instructional designers can be sorted into two categories in terms of the situations in which they operate and the utilization problem they face. Those that will be called *micro-instructional designers* operate on a fairly small scale and aim to affect individual learners. On the other hand, *macro-instructional designers* aim to introduce their products into complex organizations that instruct large numbers of students. As we shall see, these two sorts of designers face quite different utilization problems.

The Micro-instructional Designer

Micro-instructional designers aim to influence directly the behavior of individual learners. Normally they are materials developers rather than model builders. Sometimes, as in the case of a person learning a new trade at home via microcomputer-based instruction, it is expected that the target learners will work in isolation. In this case, the micro-designer usually produces self-paced materials that are delivered or sold directly to the learner, who then proceeds to use them independently. This situation is often referred to as "distance education" (Feasley, 1982), and it places a heavy demand on the designer's ability to communicate with the learner. However, since most learners in distance education situations are strongly motivated to complete their work, there is no utilization problem at the student level. The absence of an instructor eliminates the problem at that level as well. Getting institutions to adopt distance education can be a problem presenting many difficulties, but their discussion is beyond the scope of this chapter.

Micro-designers often deal with learners who are clustered together into a class that meets at a specified time and that is led by an instructor who has control over what takes place. In this situation the instructor represents an intermediate user who must be convinced and trained by the designer before the target learners will receive the intended instruction. Frequently, as is often the case in a military or industrial training unit, the instructor is under orders from superiors to use the micro-designer's materials. But this circumstance does not lessen his or her power to sabotage the designer's intentions once the classroom door closes (Branson, 1981). And to date, micro-designers have not been very successful in getting instructors to perform as intended. This is one of the two types of utilization problems that will be of primary interest here.

The Macro-instructional Designer

As indicated earlier, macro-designers operate in a more complex setting than micro-designers. They can be model builders or materials developers and they aim to change the instructional practices of complex organizations such as schools, school systems, government departments of education, or military and industrial training units. In the final analysis the macro-designer's utilization problem is the same as that of the micro-designer—to convince and train instructors to use materials properly. However, the numbers of instructors to be influenced is large and this compounds the difficulty. And before they can turn their attention to the instructor, macro-designers must influence the decision-makers in the target organization to adopt their product and to make it available to instructors.

The major complicating factor for macro-designers is that the power to determine instructional policy and to select instructional materials is often shared by numerous individuals within organizations, and that outsiders sometimes exert an influence as well. Typically the making of these decisions involves instructors, their superiors, policy boards, and often many others. Usually this sharing of power means that someone has to sell the virtues of ID to many individuals with widely divergent perspectives before the macro-designer's product can be adopted and distributed to instructors for implementation. Even if the organization decides to adopt the materials, their effects on the targeted learners can be severely distorted by the subsequent actions of instructors and others who provide support for instruction.

The macro-designer faces the ultimate ID utilization problem—the one that most people think of when they observe that instructional designers have not been successful in getting their products into use.

The Effect of Setting

For both the micro- and macro-designer the task of getting ID products adopted and implemented is different in different settings having different missions, types of personnel, and authority structures. In general, settings can be sorted into two categories with respect to these matters. Military and industrial training units fall into one category. They tend to be rather receptive to adopting ID products, but good implementation does not necessarily follow (Back & McCombs, 1984). The second category is schools and colleges. These units tend to be less prone to adopt ID products and tend not to implement them as intended (Berman & McLaughlin, 1977).

Table 16.1 compares the military-industrial setting with the school-college setting on six variables that probably affect ID adoption and implementation decision. As can be seen, military and industrial units, with their emphasis on efficiency, have considerably greater incentives to adopt and implement ID products. And school and college instructors are much more likely to resist explicit suggestions from outsiders as to what or how to teach than are military or industrial instructors. This suggests that designers who aim to impact schools or colleges can usually expect more resistance than their military-industrial counterparts.

Summary of the ID Utilization Problem

For the purpose of this chapter, then, we will consider an instructional designer to be anyone who tries to improve instruction through a process that includes prespecified learning outcomes, evaluation in terms of learner performance, and the development of replicable and documented procedures for adjusting the conditions of learning. For designers to be referred to as *model builders,* the product to be disseminated is a model to be used by others for developing learning objectives, performance measures and instructional procedures. But the focus here will be upon the dissemination problems of *materials developers*—designers who product is instructional materials.

It will be assumed that potential adopters of ID products go through five stages as they pass from first knowledge of the product to full use of it. The stages are knowledge, persuasion, decision, implementation, and confirmation. Adoption is defined as deciding to make full use of a program, and implementation is defined as putting the program into use.

The focus will be on two varieties of the ID utilization problem: (a) the micro-designer's problem of convincing individual instructors to adopt and properly implement validated instructional materials, and (b) the macro-designers' problem of first convincing organizations to adopt ID products and

TABLE 16.1
Comparison of Six Variables of Instruction in Industry and the Military Services, and in Public Education

Variable	*Industry/Military*	*Public Education*
Structure	Centralized: information flow rapid vertically and horizontally. Instructors part of chain of command	Decentralized: information flow slow but better horizontally than vertically. Individual schools and teachers fairly autonomous
Mission of Training and Education	Accommodate turnover and growth in personnel; accommodate changes in knowledge and skills required by organization and personnel; improve skills and performance of job incumbents	Transmit accumulated knowledge of society to future participants in society. Some recent emphasis on projected employment skills.
Focus of performance of skills and knowledge learned	Immediate application of skill and knowledge to new or existing job; transferability (relevancy) of learning	Actual performance delayed; little emphasis on learning transfer
Economic basis	Training must provide minimum competency at minimum cost for maximum number of people; training is nonproductive (i.e., it costs money)	No requirement to rush education; teachers not concerned (for the most part) with cost-effectiveness of instructional methods
Degree of academic freedom	Fairly low—limited by demand for efficiency	High; what to teach broadly described by curriculum scope & sequence—method is teacher's decision almost exclusively
Role of instructor	Temporary subject-matter expert; not well versed in methods; anxious to get back to the field; not hired as an instructor	Perceived as subject matter and methods expert. Career is teaching and was hired as a teacher

subsequently getting instructors to use them properly. For both macro-designers and micro-designers, it makes a difference whether the target is a military-industrial setting or a school-college setting. In general, military-industrial settings tend to be more hospitable to designers, at least in terms of product adoption.

Finally, it should be noted that the learner, who is the ultimate target of both the macro-designer and the micro-designer, rarely participates directly in deciding either to adopt or to implement the designer's products. As we shall see, this has profound implications for designers who aim to get their products into proper use.

QUALITY AS A STIMULUS FOR ADOPTION

Now that the utilization problem has been clarified, we will turn to a discussion of possible ways of dealing with it. A simple and widely practiced remedy is simply for designers to improve upon what they are doing now—developing effective and efficient instruction. But as will be seen, there are problems with this approach.

Many designers cannot understand why ID has not been adopted more widely and better implemented. They point to the fact that ID achieves the primary goal of everyone involved in education and training—more effective and efficient learning. This premise leads to the assumption which undergirds most current approaches for getting ID into use—that a good product will automatically be attractive to potential adopters and will be demanded by them.

If a strong user demand for ID products is assumed, then dissemination can be thought of as a postdevelopment task that consists of two parts: (a) bringing well-designed products to the attention of the potential adopters, and (b) after adoption more or less automatically occurs, providing training and other support for proper use of the materials. This is the way that many prominent ID models depict the implementation process (Andrews & Goodson, 1980). And this way of thinking about the problem implies that the best way to improve ID utilization would be to: (a) find ways to make products instructionally more effective and efficient, (b) find better ways to communicate with users, and (c) provide better instructor training and other support for implementation. In general, this is the way that most designers have proceeded.

This is a comfortable way for designers to think about the utilization problem because it suggests that everything will come out all right if they continue doing what they like to do, only do it better. But, as we have seen, potential users at both the organization level and the instructor level have been rejecting ID products and many of those that do adopt have not used them as designed (Goldman, 1982).

Much evidence suggests that at least part of the reason for the present problem in getting ID into proper use traces back to designers' implied assumption that materials that are instructionally effective and efficient will automatically be attentive to potential adopters' needs (McCombs, Back, & West, 1984). The fallacy of this assumption is well illustrated by a case history of a failed innovation project that was described in detail by Parkinson (1972).

The Case of the Inefficient Typewriter

In 1873, companies that were planning to market the newly invented typewriter had a dilemma. The placement of the type bars on early typewriters led to jamming when the keys were hit too rapidly by a fast typist. To compensate for this it was decided to arrange the keyboard to make it difficult for anyone to type fast enough to get into trouble with jamming. After much thought and field testing, Christopher Sholes came up with a masterpiece of inefficiency. In the Sholes keyboard designer the letters QWERTY were placed along the left side of the home row of keys. This arrangement assured that a typist would have long reaches for keys at inopportune times, thus severely limiting the typing speed that could be reached. Jamming was virtually eliminated and soon the QWERTY keyboard became the standard for all typewriters.

Later, after typewriters had been redesigned to eliminate jamming, efforts were launched to get around the inefficiency of the QWERTY keyboard. One of these was to try to design a new keyboard, this time with efficiency in mind rather than inefficiency. The result came in 1932 and was the Dvorak arrangement (named after its inventor, August Dvorak). In this design, the letters were placed on the keyboard to minimize reaching and awkward moves by the typist. This arrangement was found to be easy to learn and to lead to many fewer errors and much greater typing speed than the QWERTY one.

When the designers of the Dvorak keyboard tried to get it into general use, they were totally rebuffed. A few pioneering efforts were made to introduce the new design, but these failed badly. And to this day, the QWERTY keyboard, which was designed to be inefficient, is found on almost all typewriters, and few people have ever even heard of the highly efficient Dvorak keyboard.

Why did the Dvorak keyboard, with its built-in efficiency, fail to replace the obviously inferior QWERTY arrangement? This is a complex question with many facets, but the nub of the answer is fairly simple. Clearly, taken as a group, those who would have been affected by introducing the new keyboard (the potential adopters) did not collectively perceive it to be more personally advantageous than the old one. And so the collective decision was to leave the old keyboard in place. It is important to note that the potential adopters included typewriter manufacturers, sellers, repairers, and those who taught typing, as well as typists. Clearly such matters as changeover costs, short-range discomforts, and job disruptions weighed as heavily as did typing efficiency on potential adopters' thinking. Also communication was probably such that some potential adopters may have gotten a distorted view of the potential effects of the new keyboard or perhaps heard very little about it. But after all was said and done, the apparently superior product was rejected. Although it may seem strange, this result has been observed again and again with products of all kinds (Rogers, 1983).

Implications for Instructional Designers

The typewriter keyboard story contains many lessons for instructional designers who aim to get their products into use. Three of the key ones are: (a) the way potential adopters perceive that a product will affect them personally tends to determine whether it will be adopted (and to some extent how it will be implemented), (b) demonstrated effectiveness and efficiency in performance are not the only attributes that potential adopters consider in judging new products (often these do not even have the strongest influence), and (c) changing the attitudes that underlie potential adopters' reactions to new products is not easy even if logic is on the side of the new product.

The lack of a direct correlation between a product's effectiveness and efficiency and its likelihood of being adopted and implemented as designed has been well documented (Marquis, 1969). The absence of this relation has been noted again and again in virtually all endeavors that involve trying to get people to adopt new ways of doing things. Whether the objective is selling a new brand of soap, introducing new agricultural products to underdeveloped countries, or writing a novel that will make the best-seller list, it has become quite clear that innovators who are interested in generating wide acceptance for their products will have little success unless their products reflect what users want and are willing to accept (Meadows, 1968).

USER-ORIENTED DEVELOPMENT

The evidence suggests that instructional designers who aim to get their products into use cannot assume that better quality will automatically lead to better acceptance. Instead, it suggests that they should take steps to ensure that the products meet the perceived needs of instructors and other potential users. One way to try to do this would be to mount an advertising campaign aimed at convincing skeptical potential users of the value of the existing products. But the QWERTY keyboard experience and many others like it suggest that the attitudes of potential adopters will not be easily changed. And the fact that ID products have not been highly attractive to date suggests that some adjustment in them may be a prerequisite to generating favorable perceptions.

How then can ID products be designed to be more favorably perceived by instructors and other potential adopters? The generic equivalent of this question has been asked again and again by designers of all kinds and has been of special interest to people who design new commercial products. Efforts to find answers have led to generic models for systematically designing products that have a high probability of being adopted (bought?) (Urban & Hauser, 1980). Some of the elements of these market-oriented models are relevant to the ID usage problem.

The five-step model outlined below describes one way of conceptualizing a user-oriented instructional development process (UOID). The model assumes that the potential adopters of ID products go through an innovation-decision process somewhat like the one proposed by Rogers, as described in the first section of this chapter.

Step 1: Identify the potential adopter. In this step the designer determines who would be affected if the planned product were to be adopted and especially those who would be involved in the decision to adopt. For most micro-designers the potential adopters are the instructors who would use the product. But macro-designers normally must identify other decision-makers or support personnel within the target organization as well.

Step 2: Measure relevant potential adopter perceptions. Next the designer determines (a) how the potential adopters perceive that instruction should be done and, (b) the attributes of instructional products that they perceive to be important. Macro-designers normally discover that these perceptions vary between the different types of potential adopters that they must deal with.

Step 3: Design and develop a user-friendly product. Once the perceptions of potential adopters are known, the design-and-development process begins. Normal ID procedures are used but with two modifications. First, the designer aims to incorporate into the product as many as possible of the attributes that are valued by the potential adopter and tries to make the presence of the attributes as apparent as possible. Second, the criteria used by the designer to evaluate the product formatively and summatively are expanded to include the degree to which the potential adopter: (a) perceives the product favorably, and (b) tends to adopt it and implement it properly.

Step 4: Inform the potential adopter. At this point a good user-friendly product has been developed that has attributes that the potential adopters value. The next step is to inform the potential developer about the product, stressing

its user-valued attributes. The channels of communication that are selected should optimize the chances for stimulating favorable user perceptions. Macro-designers must often use different messages and communication channels for different types of potential adopters.

Step 5: Provide postadoption support. Once adoption has occurred, the instructor (and to some extent others in the adopting organization) must be given the tools needed to implement the product. All hardware must be delivered on time and any required adjustments in the instructional environment made. The adopter must be given appropriate training and encouragement as needed.

There are three major differences between standard ID practices and the UOID model just outlined. First, designers do not normally measure potential adopters' perceptions of their products or try to use them in establishing product attributes. Second, it is not usual for designers to formulate messages about their products or to select communication channels with the objective of creating favorable potential adopter perceptions. And third, designers do not often use adoption and implementation success rates as criteria for evaluating their products. We shall look at these matters more closely; but first we need to acknowledge a potential problem with user-oriented development.

Designers and User-Oriented Development

Designers who work in academic settings often wince when confronted with a user-oriented approach to ID such as the one outlined above. There are two reasons for this. First, as has been nicely pointed out by Kilman (1965), academics feel uncomfortable with attempts to manipulate systematically their product designs and their communications with potential users intending to optimize the chances for favorable impact. Academics might concede that market-oriented design processes work with respect to selling products like soap and political candidates, but they may not agree that such processes are appropriate for improving education. This is clearly a matter for individual judgment. However, the discussion of this subject by Kilman (1965) is recommended reading.

The second reason for caution by designers in accepting UOID procedures relates to their fundamental objectives. Many designers might concede that ID products designed in this way might be more appealing to users, but they are unlikely to see a way of attending to the perceived needs of potential adopters without compromising their own principal interest—instructional quality. Whether this concern is valid depends on the skill of the designer in resolving the feedback obtained from potential adopters. Clearly, dealing with user requirements such as low implementation cost makes it more difficult to design effective ID products. But skillful designers have done it.

And the evidence suggests that if it were to be done the impact of ID would be increased.

Key Attributes of Innovative ID Products

It is almost axiomatic that the way potential adopters perceive a product or a new way of doing things will bear heavily on whether they will adopt it. Research findings support the general principle that innovations perceived favorably by potential users will be more quickly and widely adopted than those that are perceived unfavorably (Myers & Marquis, 1969). Thus it would be to the advantage of impact-oriented designers to include in their products attributes that will favorably influence the perceptions of potential adopters.

Clearly the best way to determine the perceptions of potential adopters relating to a particular instructional product is to measure them directly. Excellent survey research techniques have been perfected for collecting such measures (Calder, 1977; Lehmann, 1979). However, several researchers have compiled generic lists of perceived characteristics of innovations that have been demonstrated to be more or less well related to adoption or rejection (Brickell, 1971; Kester, 1976; Zaltman, Duncan & Holbek, 1973).

Perhaps the best known among the lists of innovation attributes considered to be favorable to adoption is the one by Rogers and Shoemaker (1971). After reviewing more than 3,000 papers dealing with fields from agriculture to marketing, Rogers and Shoemaker concluded that five variables were relevant. These were the relative advantage and compatibility of the innovation with respect to the potential adopter's existing needs and values; and the complexity, observability, and trialability of the innovation. Perceived relative advantage, compatibility, trialability, and observability were considered to be positively correlated with adoption. Perceived complexity was considered to be negatively correlated with adoption. Descriptions of each of these attributes and of the way they might relate to ID products follow.

Relative Advantage and Adoption of ID Products

Relative advantage is defined by Rogers and Shoemaker as "the degree to which an innovation is perceived by the potential adopter as being better than the idea or thing it supersedes" (p. 138). They also describe relative advantage as the "strength of the reward or punishment for adopting the innovation." Many authorities consider relative advantage to be the attribute that most powerfully influences decisions to adopt or reject innovations and it is one of those for which there is probably the greatest research support (Tornatzky & Klein, 1982).

What attributes do potential adopters consider when they decide whether an ID product has a relative advantage over something else? It is not possible to construct a single, comprehensive list of attributes that would apply to all

potential adopters in all situations. However, experience suggests that the breakdown given in the next section includes many of the key factors that have operated in most settings.

Relative Advantage from the Instructor's Point of View

For most experienced instructors, judging whether a new ID product is relatively advantageous has boiled down to comparing the personal consequences of its use with what these instructors had been doing in terms of two variables: (a) the amount of work required to implement and use the product; and (b) the effect of use upon their relationships with learners. Some of the key elements of such a comparison are as follows:

The nature of instructor-learner interactions. Most experienced instructors have preferred to have relatively constant personal interaction with learners and have preferred to deal with learners as a group rather than one at a time. Consequently they have tended to reject or modify products that imply either reduced instructor-learner interaction or self-instruction by learners (Bennis, Benne, & Chin, 1969).

Degree of the management requirement. Many experienced instructors do not like to manage things, do not feel they have time for much classroom management, and are not especially good managers. Consequently they have tended to reject or modify products that involve considerable formal record keeping, scheduling, or keeping track of materials (Turnbull, Thorn, & Hutchins, 1974).

Potential for motivating learners. Many experienced instructors believe that instruction that focuses upon learners interacting with materials tends to be unmotivating. Thus they have tended to reject materials-based teaching methods (Bennis, Benne, & Chin, 1969).

Experienced instructors of unmotivated learners have tended to assume that any materials used must be of interest to their students. Accordingly they have tended to demand that materials be well formatted, contain language that the instructor perceives to be at the level of the learner, and include a prominent high-quality visual component. Unillustrated or sparsely illustrated text has tended to be rejected by such instructors.

Quality of student learning. Instructors obviously want their students to learn. Therefore they have favored products that they believe will improve learning. However, they have had to be convinced that any content that is taught is important and they have often depended upon their intuitive judgment in evaluating either the quality of objectives or the effectiveness of materials (Kester, 1976).

Relative Advantage From the Organization's Perspective

Decision-makers in organizations that deliver instruction have tended to use criteria different from those used by instructors in evaluating the relative advantage of adopting a new ID product rather than staying with their present practices. Here are some of the attributes that have often been considered.

Cost. Most mature instruction-oriented organizations must operate within tight annual budgets that vary little from year to year. Consequently the perceived cost of implementing and maintaining ID products has often been *the* key factor in decisions as to whether to adopt. Products that are perceived to require large initial outlays or heavy continuing expenses for maintenance have tended to be rejected or modified so as to lower costs. In addition to money, expenditures of time, personnel, space, equipment, books and other resources have often been considered to be part of cost (Bickell, 1971). It should be pointed out that there is presently no consensus on how actually to measure cost of instruction (Back & McCombs, 1984).

Disruptiveness. Decision-makers in mature instruction-oriented organizations tend to abhor disruptions. Consequently, they have tended to favor ID products that they think will have wide acceptance among members of the organization and, where appropriate, among the organization's benefactors and clients. They have also favored products assumed to require few adjustments in the organization's policies and operating procedures (Turnbull et al., 1984; Wolf, 1973).

Quality of student learning. Like instructors, mature instruction-oriented organizations want learners to learn. Furthermore, many such organizations are under pressure to instruct as efficiently as possible. And so they have tended to favor ID products assumed to lead to effective and efficient instruction. However, this attribute has often been given lower priority than low cost or low disruptiveness.

Other Variables

The remaining four variables on the Rogers and Shoemaker list of key attributes of innovations are probably less important than *relative advantage* in influencing the judgments of potential adopters of ID products. Consequently, they will here be dealt with less comprehensively. The descriptions of the attributes are listed in the probable order of their influence.

Complexity is probably second to relative advantage as an influence on potential adopters' attitudes toward ID products. Complexity refers to the degree to which an innovation is perceived to be difficult to understand and

use. Both instructors and decision-makers in organizations have tended to reject or modify new ID products that they perceive to be complicated (Turnbull et al., 1974). And to them complicated has often tended to mean that the success of the innovation absolutely depends on a large number of things being done right by people in the organization, by the instructor, or by the learners. As the list of essentials for successful use of an innovation has grown longer, and as the requirements for precision have become greater, the tendency to reject or modify it has grown. The presence of large numbers of essential components and the need for complicated implementation instructions for administrators, instructors, or students are clues that a product may be too complex for wide adoption to occur.

Compatibility refers to the degree that an innovation is perceived to be consistent with existing values, past experiences and the felt needs of potential adopters. All mature instruction-oriented organizations and instructors acquire a belief as to the way instruction should be carried out. This perspective arises out of what the instructor or the organization values and wants and what their experience suggests is right. Often, these perceived values become operationally defined as formal rules, laws, and operating procedures. Examples are company policies, classroom discipline rules, and state textbook adoption codes. Clearly, both instructors and organizations have tended to reject or modify ID products that have not fit their perceived norms for carrying out instruction (Brickell, 1971). The chances for adoption have been especially dim if the product is incompatible with formal established rules, laws, or policies (Rosencranz, 1975).

Trialability and *observability* are probably the least important of the Rogers and Shoemaker attributes to instructional designers. They refer to the ease with which an innovation can be tried out on a small scale by potential adopters and the degree to which the positive results of an innovation are visible to others. Independent, instruction-oriented organizations have often insisted upon a low-cost, short-duration trial of a product before considering its adoption. Products with a format that facilitates low-cost, small-scale testing have tended to be favored by such organizations as well as by some instructors. Nonsequential modules of instruction are an example of a trialable format. A hardbound textbook with sequential chapters is not an example. Also, both instructors and organizations have tended to be attracted to ID products that have observability—those that produce easily detected results (especially if they are achieved quickly). In part, this is probably due to the fact that such products attract potential adopters' attention. But another attraction is that they are easy for decision-makers to use to satisfy demands for results by political constituencies (Nelson & Sieber, 1976). An example of the effect of observability is the fact that computers and other hardware tend to be adopted more quickly and easily than software innovations.

Designing ID Products to be User-Friendly

The implication of the last few pages is obvious. Assuming that potential adopters continue to react as they have in the past, designers who want to get their ID products better and more widely adopted should be sure that they are perceived by instructors to be simple to use rather than complex, compatible with existing ground rules, easy and cheap to experiment with, and likely to produce quick and dramatic results. Also, the instructor should perceive the product to foster, or at least permit, instructor-learner interactions, to require minimum instructor management effort, to motivate the target learners, and to communicate easily with the learners. Of course, ID products also need to be effective and efficient in stimulating learning and should be perceived that way by instructors. Finally, products of macro-designers who aim to influence organizations should also be perceived by the appropriate decision-makers to be inexpensive and nondisruptive of the organization.

Product Attributes and Implementation

Notice the emphasis on perceptions in the discussion of attributes. The decision to adopt a product appears to depend strongly on the potential user's subjective perceptions of it. And these may or may not correspond to reality (Urban & Hauser, 1980). Instructors have been known to reject summarily as impractical instructional programs that had not been examined because they had been described as "programmed instruction." On the other hand, administrators have become enthusiastic about programmed instruction when it was described as "cost-effective" or "highly efficient."

Once an innovation has been adopted, and the process of implementation begins, perception tend to be displaced by reality. Adopters begin to compare their actual experiences with the product against what they had expected from it when they chose to adopt. For a product to remain credible the perceived relative advantages that led to its adoption must turn out to be real advantages during use. And the program that was perceived to be inexpensive must not turn out to have large hidden costs or to force the instructor to invest an inordinate amount of time and effort in planning. If the gap between preadoption beliefs and postadoption realities is negative but small, adopters tend to adapt the product to fit their needs. But if there is a large negative gap, the adoption is often reversed and the adopter is left with a negative attitude toward the product.

Accordingly, the designer employing UOID must think about user-favored attributes in two ways as they are designed into ID products. First, they must be displayed so that the potential adopter perceives the product favorably enough to adopt. Second, the attributes must be real enough to retain the adopters' enthusiasm during and after implementation. Otherwise the result may be rejection or potentially damaging modification.

Procedures for Informing the Potential User

Once a designer has developed a user-friendly product the next step in the UOID process is to inform the potential users of the product's existence and to supply the information that is required for them to decide to adopt. If the designer aims to optimize the chances for adoption to occur, the message that is communicated to the potential adopter should emphasize the attributes of the product that earlier surveys have indicated will be perceived favorably. An especially effective technique for designing messages is to "position" the product—to emphasize those attributes that are not only perceived favorably by potential users, but that also tend to distinguish the product favorably from its competition (Urban & Hauser, 1980).

Experience suggests that the choice of communication channel helps to determine the influence of a message about a new product. Mass media such as newsletters, group meetings, or radio and television can reach large numbers of people quickly and easily (Sikorski et al., 1976). But does the message really get through? Experience suggests that it does if the potential adopter is in the early stages of deciding about a product and is seeking only general information (Rogers, 1983). But later, when a decision is imminent, there tends to be need for face-to-face contact with an advocate who is trusted by the potential adopter (Copp et al., 1958). The adjective "homophilous" is often used to describe a person who is similar to a potential adopter (and therefore trusted by him or her) (Lazarsfeld & Merton, 1964).

Many prominent models for the innovation-diffusion process suggest that potential adopters' decisions are influenced by the person who delivers a message about a new product as well as by the nature of the message and the communication channel. Research has shown that potential users adopt new products at different times after they have heard about them. For purpose of analysis, potential adopters have been classified as innovators, early adopters, early majority, late majority, and laggards in terms of their propensity to adopt (Midgley, 1977). It is generally posited that some of the innovators and particularly some of the early adopters (referred to as "opinion leaders") can exert a word-of-mouth influence on the others to adopt (Robertson, 1971).

The innovation-diffusion models suggest a strategy for instructional designers to use to communicate effectively with potential adopters of their product. Simply stated, designers who want to encourage adoption should identify the opinion leaders within the potential adopter group(s) and concentrate the initial communication effort on trying to get these people to adopt, or at least to express their approval of the product publicly. Experience from noneducational settings suggests that, if this can be done, a sort of bandwagon effect will be set in motion in which adopters will influence other potential adopters to adopt (Coleman et al., 1966; Whyte, 1954). Conversely, the models suggest that it would not be very productive to concentrate early efforts upon the innovators (they will probably adopt anyway) or those in the late majority or laggard categories (they will be very slow to adopt).

Obviously this strategy depends on the ability of a designer to classify potential adopters according to their propensity to adopt, and especially to identify the opinion leaders. Measuring opinion leadership involves picking out the individuals within a group of potential adopters who command the most peer respect. Rogers (1983) suggests four methods for doing this: (a) direct questioning of group members, (b) collecting ratings from selected informants, (c) obtaining self-ratings from group members, and (d) direct observation of social-contact frequencies. All of these techniques have been used with success, but all have definite limitations (Rogers, 1983).

Two points should be kept in mind in trying to use opinion leaders as vehicles for influencing potential adopters. First, opinion leaders within organizations tend to reflect the norms of the organization (Rogers & Rogers-Agarwala, 1976). Thus, when a social system's norms favor change, opinion leaders tend to be innovative, but when a system's norms do not favor change, opinion leaders are not especially innovative. With this in mind, designers can expect resistance from opinion leaders when they try to introduce their products into an organization with a conservative value structure. A second important point is that opinion leadership can be product-area specific (Silk, 1966). And so it should not be assumed that a person who is an opinion leader with respect to military strategy will necessarily command high respect when it comes to selecting training packages.

Supporting Implementation

As we have seen, the decision to adopt often depends on the subjective judgments of decision-makers as to how well an innovation will solve some problem. But once the adoption decision has been made, someone has to implement the innovation (make it work) and doing this often depends on practical matters, such as money, facilities, equipment, and training. Much evidence suggests that the failure to supply adequate support along these lines accounts for many of the problems in getting ID properly implemented (Fullan & Pomfret, 1977).

Before turning to the specifics of providing support for implementing ID, we need to briefly consider the way users tend to approach implementation. Situations in which an instructor implements a new instructional program just as the developer specified appear to be the exception rather than the rule (Yin, 1978). What appears to happen more often is what Rogers (1983) has called "reinvention," or adapting of a product to fit local conditions. This process was studied in detail by Hall and Loucks (1978), who concluded that users typically move from nonuse through mechanical use, to what they consider to be higher levels of use that involve making fairly substantial departures from the way the product is used initially. This tendency of users to adapt rather than blindly to adopt new products has led some authors to propose that developers should deliberately build flexibility of use into their products to make them more acceptable and usable (Bezuszka, 1975).

Need for Preimplementation Planning

Sometimes inadequate support for implementing a new product can be traced back to an uninformed adoption decision. Such decisions occur most often in macro-systems in which the decision-makers lack contact with the firing line and are under time or political pressure to make changes in the system (Pincus, 1974). Under these circumstances, it is not unusual for those who must actually implement a newly adopted product to discover that they must do so under impossible time or resource constraints. These circumstances often lead to poor implementation, bad results, and finally discontinuance or damaging reinvention. Good ID examples of this situation are most common in public education, when legislators or public officials decide in haste to introduce a new technology (Task Force on Educational Assessment Programs, 1979).

Perhaps the most important step that an organization can take in providing the necessary support for implementation is to avoid hasty decisions of the sort just described. Probably the best way to do that is to be sure that those who must implement a new product participate in the decision to adopt, especially in being sure that the potential adopter organization has the resources required to put the new product to good use (Zaltman et al., 1973). As a check on the validity of initial judgments of support requirements, organizations often run small-scale tests of a product prior to making final decisions (Benne, 1972).

There appear to be at least three things that an instructional designer can do to reduce the likelihood of hasty decisions to adopt. First, they can make their products as explicit as possible, especially with respect to the resources that are required for implementation. (This requirement is a major reason for the earlier caution about trying to implement models for the ID process.) Also, designers can facilitate small-scale testing by designing their products to be trialable (see the earlier discussion of *trialability*). Finally, designers can arrange for direct (i.e., face-to-face) or indirect (i.e., mediated) preadoption counseling of potential adopters with respect to the resources required for proper use of their products.

Space limitations prevent treatment in detail of all of the specific types of support that may be needed by persons who implement ID products. However, it is possible to classify these four categories: moral support, tactical support, training support, and material support. The following brief descriptions indicate the nature of each category.

Moral support refers to pats on the back and other forms of encouragement to use the innovation that are provided to the person who is trying to implement it. In the case of ID products, the recipient of moral support is normally an instructor and the giver is a superior, a colleague, or an agent of the ID. Moral support can take the form of kind words or formal rewards such as salary differentials, adjustments in work loads or citations. Experience is almost uniformly positive about the implementer's needs for moral support, especially if a major change in behavior is involved (Berman & McLaughlin, 1975; Zaltman et al., 1973).

Tactical support refers to removing or changing organizational practices and procedures that impede implementation. Again the recipient of tactical support in an ID implementation setting is normally the instructor. But the giver must be someone from within the adopting organization who has the authority to change policy. Some examples of tactical support for ID product implementation are (a) replacing norm-referenced grading practices with pass-fail grading, (b) changing the criteria used to evaluate instructors' performance, and (c) changing the criteria for selecting instructional materials (e.g., state textbook-adoption codes). Normally, the instructional designer's role in providing tactical support is limited to recommending actions. It should be noted that the degree of tactical support required to implement a new product tends to be inversely related to its adoption and implementation (see the earlier discussion of compatibility). Back and McCombs (1984) have described examples of the need for tactical support in an important ID setting—the U.S. Air Force.

Training support refers to the need to ensure that all who will be affected by the introduction of an innovation are prepared to do whatever will be required of them. In most ID implementation efforts the principal recipient of training is the instructor, but often others such as school principals and purchasing agents must be dealt with as well. Research generally supports the proposition that training support facilitates implementation of new instructional programs, but there is disagreement about the nature of optimal instructor-training programs (Fullan & Pomfret, 1977).

Materiel support refers to providing any supplies and materials that are needed for implementation on time and in sufficient quantity. Once again the instructor is the primary recipient of material support for implementing ID products. ID material support includes providing for such things as books, classroom space, computer software, overhead projectors and objects to be used by students, along with appropriate storage space and inventory procedures. Start-up material support is required to get product implementation under way and maintenance support is required to keep quantities of essential elements available and to ensure that items are in good repair (Back & McCombs, 1984). Designers can play a major role in material support by ensuring that developed products and their components are easily available.

IMPLEMENTING USER-CENTERED DEVELOPMENT

A major theme of this chapter is that adoption and implementation rates for ID products are strongly influenced by the degree to which the products are perceived by potential adopters as meeting their felt needs, and ultimately by how well those needs are actually met. A second prominent theme is that potential adopters of ID products base their judgments on many factors in addition to the product's effectiveness and efficiency in promoting learning. These points have led to the suggestion that designers who aim to get their product adopted and used well should consider adopting a user-oriented approach to ID, such as the five-step approach outlined as follows:

Step 1. Identify the persons who would be affected if the planned new instructional product were to be put into use (the potential adopters).

Step 2. Measure the perceived needs of the potential adopters with respect to instructional procedures and instructional products.

Step 3. Design and develop the ID product to meet the potential adopters' perceived needs (as well as the requirement of being effective and efficient in promoting learning).

Step 4. Inform the potential adopter about the finished ID product, emphasizing those attributes that relate favorably to perceived needs.

Step 5. Facilitate the implementation of the finished ID product by arranging for four types of support for the instructor or other implementer: moral support, tactical support, training support, and materiel support.

There is nothing especially novel in user-oriented development. This approach has been used with success for years by businesses that bring new products to the market. And it is not surprising that the keys to applying UOID successfully are: (a) to become very knowledgeable about the potential user's problems and preferences, (b) to establish good rapport and lines of communication with the potential user, and, (c) to attend to many details. Unfortunately, getting these things done often calls for knowledge and skills that many designers do not have.

It is not unusual for instructional designers to find that they lack some aspect of the knowledge and skills that are required to do their job. In fact, it has become more or less standard practice for designers to team up with experts in the subject matter (SMEs) and with editors, graphics designers, computer programmers, and other specialists in mediating instructional products (Misselt & Call-Nimwick, 1978; Roblyer, 1981). More recently some designers have been adding instructors and other types of potential adopters to their design-and-development teams (Burkman, 1974). Including users on design teams is based on the assumption that they will inject useful ideas into the design process about teaching procedures, learners' capabilities and classroom conditions, and that they will be able to help to communicate with the potential users about the product and to help with adopter training. User involvement, of course, applies directly to instituting user-oriented development.

What should be the role of instructors and other potential adopters on a team that is implementing UOID? There are three logical roles. First, they can be instrumental in identifying constraints to product adoption and implementation and user perceptions about instruction and the instructional process. In this regard, potential adopters on the development team can contribute their personal ideas and can help to collect and interpret data from others. The second role is to aid in determining when the product reflects the attributes that users will require. And finally the potential adopter-team member can be used to communicate with colleagues, or at least to pass judgment on the effectiveness of communications.

It will be noted that the suggested role of the potential user on an ID design and development team is not cosmetic. It clearly improves the credibility of a product with potential adopters to say that one or more of their colleagues has been involved in its develcpment, but this is not the most important advantage of user involvement. By listening attentively to perceptive potential adopters and acting on their suggestions, designers can shape their products to better fit users' perceived needs. Also, the evidence is quite clear that potential adopters are more likely to be influenced by contacts with persons like themselves than by those who are perceived to be different (Rogers & Shoemaker, 1971).

User involvement on ID development teams can be a negative influence if task assignment is not well done. Instructors and other potential adopters are not likely to have well-honed skills in instructional design, evaluation, written communication, or media production. And they are not necessarily experts in the content of subjects they teach. The proper way to involve potential users in UOID is to be sure that they have strong input *in their areas of expertise.* Normally those areas are knowledge of the learner, of the operating constraints, and of the potential user. As is the case with any development team member, it is unwise to assign potential adopters to tasks for which they are not qualified.

A Last Word

Clearly, user-oriented instructional development is a much more complex process than straightforward instructional design. It requires that extra time and effort be spent in measuring and accounting for user perceptions and requirements and in informing and supporting users. This extra effort, in turn, means that costs will be higher. The fact is that dissemination costs money. And, if the development and dissemination are linked, as is proposed in UOID, projects will be bigger and longer and development costs will be higher. Nevertheless, ID in use is a far different product from ID on the shelf. And, as the saying goes, "there ain't no free lunch."

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AUTHOR NOTES

Ernest Burkman is a Professor in the Department of Educational Research, Development, and Foundations, Florida State University.