DOCUMENT RESUME

ED 383 343 IR 017 198

AUTHOR Surry, Daniel W.; Farquhar, John D.
TITLE Adoption Analysis and User-Oriented Instructional Development.
PUB DATE 95
NOTE 12p.; In: Proceedings of the 1995 Annual National Convention of the Association for Educational Communications and Technology (AECT), (17th, Anaheim, CA, 1995); see IR 017 139.
PUB TYPE Reports - Evaluative/Feasibility (142) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Adoption (Ideas); Individual Characteristics; Instructional Design; *Instructional Development; *Instructional Materials; Models; *Social Environment; Social Influences
IDENTIFIERS Organizational Culture; Technology Integration; User Oriented Instructional Development

ABSTRACT

This paper discusses the importance of considering the social context in which an instructional product will be used during the development process. It is contended that traditional instructional product development models are inadequate because they ignore social context. The use of inadequate traditional design models results in the development of instructional products that may be instructionally effective, but that are not desirable to potential adopters. Two emerging theories, Adoption Analysis and User-Oriented Instructional Development, are presented as tools that instructional developers can employ in order to increase the adoption of their products. The focus of adoption analysis is on the individual (user characteristics and perceived attributes) and organizational factors (physical environment and support environment) that could impede or facilitate the adoption and integration of a new technology. The importance of incorporating the emerging theories into existing instructional development models is described. The paper concludes by calling for a new vision of instructional development in which the success of an instructional product is measured by its successful adoption just as much as success is now measured by its instructional effectiveness. Six figures illustrate the concepts. (Contains 17 references.) (Author/MAS)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it

☐ Minor changes have been made to improve reproduction quality

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

ED 383 343

Adoption Analysis and User-Oriented Instructional Development

Authors:

Daniel W. Surry
Computing, Communications & Media Services
California State University, Fresno

John D. Farquhar
Program of Training and Development
Pennsylvania State University, Harrisburg

IR017198

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

S. Zenor

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Abstract

This paper discusses the importance of considering the social context in which an instructional product will be used during the development process. The authors contend that traditional instructional product development models are inadequate because they ignore social context. The use of inadequate traditional design models results in the development of instructional products that may be instructionally effective but that are not desirable to potential adopters. Two emerging theories, Adoption Analysis and User-Oriented Instructional Development, are presented as tools that instructional developers can employ in order to increase the adoption of their products. The paper describes the importance of incorporating the emerging theories into existing instructional development models. The authors conclude by calling for a new vision of instructional development in which the success of an instructional product is measured by its successful adoption just as much as success is now measured by its instructional effectiveness.

Technology is a social phenomenon. The design, development, adoption and diffusion of technology are inherently social processes. Technology is developed by people in a particular environment and culture and is intended to be used by people in a particular environment and culture. As Howard Segal writes in his book *Future Imperfect* (1994), "all structures and machines, primitive or sophisticated, exist in a social context and, unless designed for the sake of design itself, serve a social function" (p. 2).

Theorists and practitioners in the field of instructional development (ID) often neglect or ignore the social context into which their instructional products are intended to be used. Dalton (1989) writes about instructional developers that "although we can fill instructional gaps with fervor, we never seem to examine our solutions in light of the wants of the implementors" (p. 22). Burkman (1987) writes that instructional developers commonly believe products which result in more effective and efficient instruction will, as a direct result, be attractive to potential adopters. Ralph W. Tyler (1980) adds that "many developers of technology accept the view that as time passes, there will be increasing use of the innovation until it has become a common element in school practice" (p. 11). The basic fallacy pointed out by these statements is that development of effective instruction combined with the passage of time does not automatically lead to the widespread adoption of an instructional product. Instructional products are too often "designed for the sake of design itself." They are often designed without regard to the social factors that influence adoption and utilization and this results in the development of instructional products that are technically sophisticated and instructionally sound but that nobody uses.

The purpose of this paper is to discuss the process by which instructional products are developed and to describe two emerging theories that might link the people who design instructional technology more closely to the people who are the intended users of the technology. The theories of User-Oriented Instructional Development (UOID) (Burkman, 1987) and Adoption Analysis (Farquhar & Surry, 1994) are potentially powerful tools for instructional developers. By incorporating these two theories into their design activities, instructional developers can create products that are not only "effective and efficient" but that are also useful and desirable to the people who are the intended users.

Limitations of Existing Product Development Models

If we accept the premise that instructional designers often neglect or ignore the social context into which their products are to be used, the obvious next step to ask why this is the case. One likely reason for this neglect can be found by examining the theoretical models commonly used in the field of instructional technology. These models are used by instructional designers and systems developers to manage and organize instructional development activities and to communicate the overall process to clients (Gustafson,1991). Instructional development models provide the procedural framework by which instructional products are produced.

There are numerous models of instructional development. Gustafson (1991) skillfully organizes many of the most widely-used instructional development models into a logically organized taxonomy. Gustafson classifies the models into Classroom ID Models, Product Development Models, and Systems Development Models. For the purpose of this paper, we will primarily discuss the product development models.

Perhaps the most widely used instructional development model is the Dick and Carey Model (1990). While Gustafson classifies this as a Systems Development Model, it is also commonly used by instructional product developers. The Dick and Carey Model (see Figure 1) describes a development process that begins with the identification of goals and proceeds through formative evaluation, revision and summative evaluation. There is little doubt that the model provides a valuable description of all of the key ID activities and places them in a logical sequence. Notably lacking from this model, however, is any mention of the social context in which the product will be implemented.

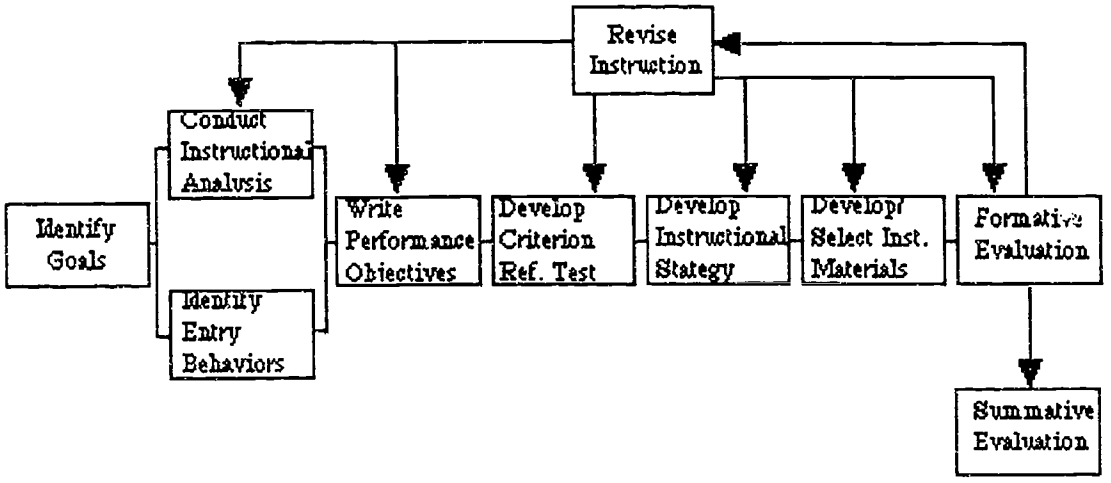

Figure 1. The Dick and Carey Model of Instructional Development

As with the Dick and Carey Model, other widely used product development models also fail to account for social context. Gustafson (1991) writes that the goal of product development models is "to prepare an effective and efficient product as quickly as possible" (p.7). While all three of the product development models reviewed by Gustafson describe a logical process for developing "an effective and efficient product", none of them contains a thorough discussion of the need to analyze the social context in which the product will be used. In fact, only one of the three, The Van Patten Model (1989), even mentions the implementation or continuing maintenance of an instructional product.

In reviewing Systems Development Models, Gustafson writes that such models usually call for an extensive analysis of the use environment before instructional development even begins. Of the five systems models reviewed by Gustafson, two -- The IDI Model and The Diamond Model -- do discuss in some detail the need for an analysis of the social context. The IDI Model (Twelker, 1972) calls for an analysis of the audience, organizational personnel, and organizational resources before development begins. The Diamond Model (1989) goes even further than the IDI Model and calls for an analysis of societal and organizational needs and for an examination of human and organizational resources before development.

The examination of the preceding instructional development models leads to three important conclusions. First, none of the most widely used product development models include an analysis of the social context as an important part of the development process. Second, product development models do not always mention adoption and diffusion, and when they do, adoption and diffusion are typically considered near the end of the development process, usually after the product has been developed. Third, while some systems development models do tend to call for a thorough analysis of social context, these models are not often used to guide the production of specific instructional products but, rather, are reserved primarily for the development or repair of broader instructional systems.

User-Oriented Instructional Development Theory

As we have seen in the previous section, few product development models discuss sufficiently the need to examine the social and physical environment into which an instructional product will be introduced. Ernest Burkman (1987) was one of the first writers to propose that, because traditional ID models fail to adequately account for the social context, instructional products have, as a direct consequence, failed to be widely implemented. Burkman writes that instructional technology makes extensive use of the research-development-diffusion (RDD) paradigm and that many such endeavors suffer from a lack of utilization. He adds that instructional technology has experienced a lack of utilization in all fields, including primary and secondary schools, colleges and universities, and even in industry and the military.

In order to correct the inadequacy of traditional models, and to increase the utilization of ID products, Burkman proposes the User-Oriented Instructional Development Process (UOID). The five step process (see Figure 2) calls for instructional developers to identify the people who will be using the product, analyze their perceptions about the product and, based upon that analysis, to develop products that are user-friendly.

User-Oriented Instructional Development

Step 1: *Identify the potential adopter*

Step 2: *Measure relevant potential adopter perceptions*

Step 3: *Design and develop a user-friendly product*

Step 4: *Inform the potential adopter*

Step 5: *Provide post adoption support*

Figure 2. The Five Steps in Burkman's (1987) UOID Process

Burkman makes an interesting and valuable point in describing the UOID that is particularly germane to the present paper. He includes three major differences between traditional ID models and his UOID theory. The three differences serve to succinctly define the differences between traditional ID theory and the emerging theories discussed in the present paper. The three major differences between emerging theories and traditional models as identified by Burkman are:

1) Traditional models do not call for instructional developers to measure the perceptions of potential adopters or to develop perception-friendly products

2) Traditional models do not ask developers to formulate messages and select communication channels in order to create favorable perceptions.

3) Traditional models do not demand that instructional developers use adoption and implementation success as criteria for evaluating their products.

One of the main theoretical foundations that underlies Burkman's UOID Theory is E. M. Rogers' (1987) theory of perceived attributes. Rogers writes that all innovations can be thought of as having five general attributes: compatibility, complexity, observability, relative advantage and trialability. The theory states that potential adopters form their opinions of an innovation based upon their perceptions of the innovation's five general attributes. Simply put, Rogers theory states that potential adopters are more likely to use a product if it is compatible with their needs, is not too complex, offers observable benefits, provides some advantage relative to other products, and can be tested or tried out prior to adoption. Burkman expands upon Rogers theory and applies it to instructional innovations by theorizing that instructional developers can increase the utilization of their products by determining and accounting for the perceptions of potential users.

While there are no published studies that specifically support Burkman's UOID Theory, there is a great deal of research to support the theory's underlying foundation that perceived attributes play an important role in adoption. Hurt and Hibbard (1989) write "it is well-documented that the characteristics of an innovation as perceived by potential adopters play a critical role on the rate of acceleration of the adoption curve" (p. 214). Among the more recent studies, Holloway (1977) found that perceptions of relative advantage and compatibility were influential in the adoption of an educational innovation by high school principals. Moallemian (1984) and Weinstein (1986) also found that perceptions played an important role in adoption in educational settings. Surry (1993) found that the perceptions of compatibility, complexity, and relative advantage were important considerations in the adoption of computer-based instructional modules by weather forecasters. Many other studies (e.g., Sekhon, 1968; Rogers, Daley, & Wu, 1982) have found that perceptions played a significant role in the adoption of innovations outside of the educational field.

Adoption Analysis

Adoption Analysis (Farquhar & Surry, 1994) is another emerging theory that is based upon the assumption that existing ID models are inadequate because they ignore the social context into which the instructional product will be introduced. Adoption Analysis is a process that calls for a thorough examination of both the context in which an instructional product will be used and of the people who will use the product. Segal (1994) writes that "if, as in the significant case of the auto, modern technology

solved a number of problems, social as well as technical, from the outset it *simultaneously* bred or helped to breed several others, social and technical alike" (p. 30). Adoption analysis, therefore, can be defined as a process that seeks to determine and account for the social and technical problems that will be bred by the introduction of an instructional product into an organization.

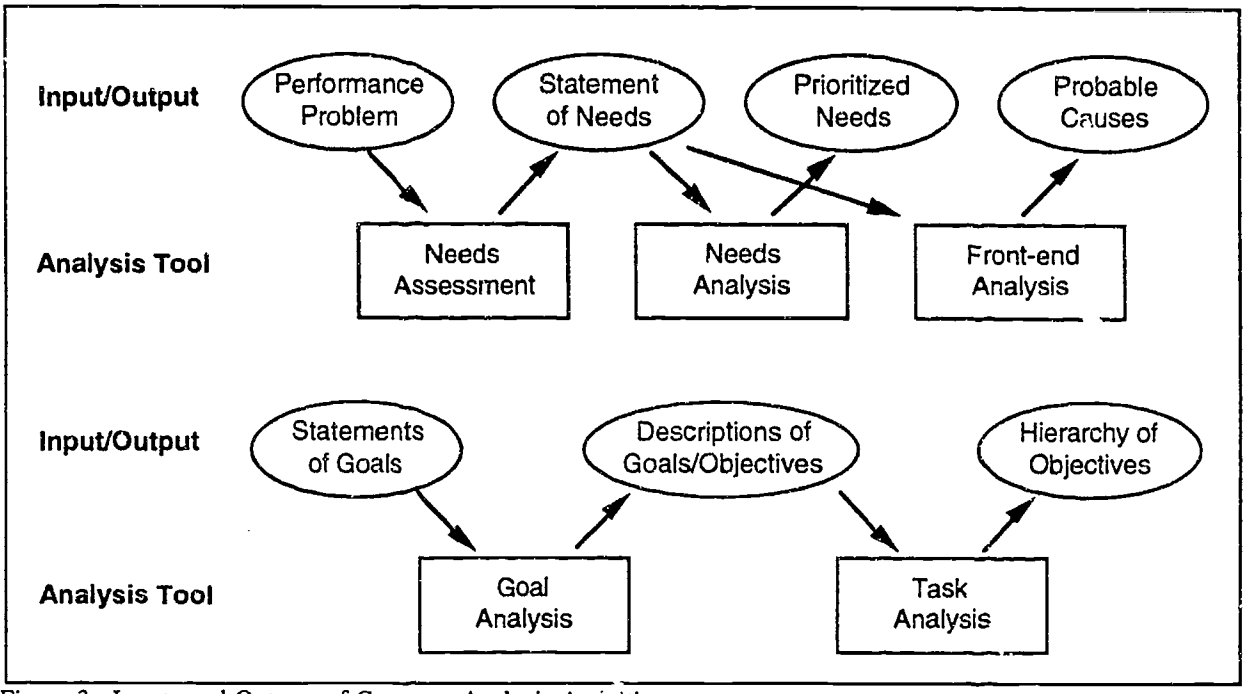

Figure 3. Inputs and Outputs of Common Analysis Activities.

An analysis phase is common to most instructional development models. Okey (1990) describes five analysis tools that are commonly used by instructional developers. As shown in Figure 3, the five tools described by Okey can be applied in a orderly sequence with the output of one analysis tool providing the input for the next. The final output of this traditional analysis sequence is a hierarchical organization of instructional objectives. This hierarchy of objectives is then used as a framework by instructional developers when developing instructional strategies and creating support materials.

The analysis tools described by Okey are very valuable in the development of instructional objectives but do not inform the developers about the social context in which the instructional product will be used. Adoption analysis can be used as an additional analysis tool for instructional developers who are concerned with the adoption and implementation of their products. The focus of adoption analysis is on the individual and organizational factors that could impede or facilitate the adoption and integration of a new technology.

Individual Factors

User Characteristics	Perceived Attributes
Motivation	Compatibility
Anxiety	Complexity
Knowledge Base	Observability
Prior Experience	Relative Advantage
Skill Level	Trialability

Organizational Factors

Physical Environment	Support Environment
Patterns of Use	Production Services
Reasons for Use	Storage / Delivery Services
Classroom Facilities	Technical Support
Management Characteristics	Ongoing Monetary Support
Existing Hardware & Software	

Figure 4. Factors Affecting The Adoption Of An Instructional Product

The characteristics of the individuals who will ultimately use an instructional product can play an important role in whether or not the product is adopted. Farquhar and Surry (1994) define individual characteristics as "all of the skills, attitudes, perceptions, and knowledge possessed by the people who will use the technology." As shown in Figure 4, Individual Characteristics can be divided into the characteristics of the user population and the perceptions that the users have of the instructional product. This focus on perceptions is closely related to Burkman's User-Oriented Instructional Development Process.

In addition to individual factors, the characteristics of the organization into which an instructional product will be used often determine whether or not the product is adopted. Organizational factors (see Figure 4) include all of the personnel, expertise, attitudes, hardware, software, facilities, and services available within, or to, an organization. Organizational factors obviously play a major role in the initial adoption of an innovation but their most important role is likely in facilitating or hampering the continued use of an instructional product in the years after its initial adoption.

In conducting an adoption analysis, the instructional developer should seek to answer a series questions concerning the individual and organizational factors that might affect adoption of the product. Figure 5 lists several of the most important questions that can help to inform an adoption analysis.

Individual Factors

User Characteristics

What motivation do the users have for using this product?
Do the users have the necessary technical skills to use this product?
Do the users have special needs that this product should address?
Have the users used technology of this nature in the past?
Do the users have the knowledge base to use this product?

Perceived Attributes

Is this product compatible with the needs and culture of the users?
Is this product compatible with the users work or study schedule?
Is this product compatible with existing hardware and software?
Is the product perceived as too complex or too simple?
Is the product perceived as offering any advantages over previous or competing methods of instruction?
Do the users perceive that they will experience observable benefits from using this product?
Do the users perceive that they will be able to test or trial the product prior to full implementation?

Organizational Factors

Physical Environment

Where will the product be used?
How will the product be used in the daily operations of the organization?
Does the organization possess the hardware needed to use the product?
Does the organization possess the necessary labs and classroom spaces?
Who will install the product and any other complementary equipment?

Support Environment

Who will deliver, maintain, and administer the product?
Who will organize and deliver any needed follow-up training?
How will supplies be stored, ordered, paid for, and delivered?
Do key decision makers support or oppose the product?

Figure 5. Key Questions That Inform Adoption Analysis

While organizational and individual factors are the input needed to conduct an adoption analysis, an adoption plan is the output (see Figure 6). The adoption plan should specify the factors that will most likely facilitate or hamper the adoption and continued use of an instructional product. The plan should include specific design features that will make the instructional product more likely to be adopted and maintained. A simplified example is that if the adoption analysis determines that none of the workstations in an organization's training lab have CD ROM drives, then the instructional product should not be packaged in or require the use of CD ROMs.

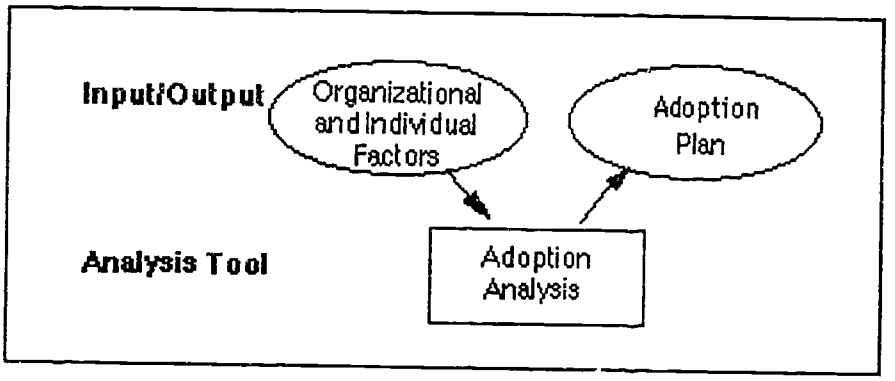

Figure 6. The Input and Output of an Adoption Analysis.

Recommendations

The theories of user oriented instructional development and adoption analysis have the potential to be powerful tools for instructional designers. It is possible that by incorporating these theories into the development process, instructional designers can develop products that are both instructionally effective and desirable to the people who are the intended users of the product. The following recommendations are provided in the hope that they will be incorporated into future ID projects:

1) Designers and developers of instructional technology should consider the adoption of their products as carefully as they consider the instructional effectiveness of their products.

Developing effective and efficient instructional products does not necessarily mean that the products are desirable or useful to potential adopters. The field of instructional development has made great breakthroughs in designing and developing effective instruction. Few breakthroughs have been made, however, in developing products that people want to use. One of the basic tenets of instructional technology is "if the objectives were not met, it means the instruction was not adequate." It seems odd,

Adoption Analysis and User Centered Instructional Design

Technology is a social phenomenon. The design, development, adoption and diffusion of technology are inherently social processes. Technology is developed by people in a particular environment and culture and is intended to be used by people in a particular environment and culture. As Howard Segal writes in his book *Future Imperfect* (1994), "all structures and machines, primitive or sophisticated, exist in a social context and, unless designed for the sake of design itself, serve a social function" (p. 2).

Theorists and practitioners in the field of instructional development (ID) often neglect or ignore the social context into which their instructional products are intended to be used. Dalton (1989) writes about instructional developers that "although we can fill instructional gaps with fervor, we never seem to examine our solutions in light of the wants of the implementors" (p. 22). Burkman (1987) writes that instructional developers commonly believe products which result in more effective and efficient instruction will, as a direct result, be attractive to potential adopters. Ralph W. Tyler (1980) adds that "many developers of technology accept the view that as time passes, there will be increasing use of the innovation until it has become a common element in school practice" (p. 11). The basic fallacy pointed out by these statements is that development of effective instruction combined with the passage of time does not automatically lead to the widespread adoption of an instructional product. Instructional products are too often "designed for the sake of design itself." They are often designed without regard to the social factors that influence adoption and utilization and this results in the development of instructional products that are technically sophisticated and instructionally sound but that nobody uses.

The purpose of this paper is to discuss the process by which instructional products are developed and to describe two emerging theories that might link the people who design instructional technology more closely to the people who are the intended users of the technology. The theories of User-Oriented Instructional Development (UOID) (Burkman, 1987) and Adoption Analysis (Farquhar & Surry, 1994) are potentially powerful tools for instructional developers. By incorporating these two theories into their design activities, instructional developers can create products that are not only "effective and efficient" but that are also useful and desirable to the people who are the intended users.

Limitations of Existing Product Development Models

If we accept the premise that instructional designers often neglect or ignore the social context into which their products are to be used, the obvious next step to ask why this is the case. One likely reason for this neglect can be found by examining the theoretical models commonly used in the field of instructional technology. These models are used by instructional designers and systems developers to manage and organize instructional development activities and to communicate the overall process to clients (Gustafson,1991). Instructional development models provide the procedural framework by which instructional products are produced.

There are numerous models of instructional development. Gustafson (1991) skillfully organizes many of the most widely-used instructional development models into a logically organized taxonomy. Gustafson classifies the models into Classroom ID Models, Product Development Models, and Systems Development Models. For the purpose of this paper, we will primarily discuss the product development models.

Perhaps the most widely used instructional development model is the Dick and Carey Model (1990). While Gustafson classifies this as a Systems Development Model, it is also commonly used by instructional product developers. The Dick and Carey Model (see Figure 1) describes a development process that begins with the identification of goals and proceeds through formative evaluation, revision and summative evaluation. There is little doubt that the model provides a valuable description of all of the key ID activities and places them in a logical sequence. Notably lacking from this model, however, is any mention of the social context in which the product will be implemented.

Much more importantly than putting forth a new ID model, what is really needed is a new way of thinking. Instructional developers should consider the potential adoption and implementation of their products as carefully as they consider the instructional outcomes. Put another way, the value of an instructional product should be measured by the degree of adoption and the success of implementation just as much as it is now measured by cognitive and affective outcomes. In order for this to happen, instructional developers will have to analyze and account for the social context in which their products will be used. Also, developers will have to make adoption and dissemination important considerations of their design models throughout the entire ID process. Adoption analysis and user-oriented instructional development can be potentially valuable tools for instructional developers who agree that this new way of thinking is necessary.

References

Burkman, E. (1987). Factors affecting utilization. In R. M. Gagné (Ed.) *Instructional Technology: Foundations*. Hillsdale, NJ: Lawrence Erlbaum.

Diamond, R. M. (1989). *Designing & improving courses and curricula in higher education: A systematic approach.* San Francisco: Jossey-Bass.

Dick, W. & Carey, L. (1990). *The systematic design of instruction* (3rd ed.). Glenview, IL: Scott, Foresman/Little, Brown Higher Education.

Farquhar, J. D. & Surry, D. W. (1994). Adoption analysis: An additional tool for instructional developers. *Education and Training Technology International, 31* (1), 19-25.

Gustafson, K. L. (1991). Survey of instructional development models (2nd ed.). Syracuse, NY: Information Resource Publications. (ERIC Document Reproduction Service No. ED 335 027)

Holloway, R. E. (1977). Perceptions of an innovation: Syracuse University Project Advance. *Dissertation Abstracts International*, 39, 572-573A. (University Microfilms No. 78-11, 656)

Hurt, H. T., & Hibbard, R. (1989). The systematic measurement of the perceived characteristics of information technologies I: Microcomputers as innovations. *Communication Quarterly, 37* (3), 214-222.

Moallemian, M. (1984). A study of college instructor acceptance of an innovation as related to attributes of innovation. *Dissertation Abstracts International*, 45, 3535A. (University Microfilms No. 85-03, 250)

Okey, J. (1990). Tools of analysis in instructional development. Educational Technology, 30 (6), 28-32.

Rogers, E. M. (1983). Diffusion of innovations. (3rd ed.). New York: The Free Press.

Rogers, E. M., Daley, H. M., & Wu, T.D. (1982). *The diffusion of home computers: An exploratory study.* Stanford, CA: Institute for Communication Research. (ERIC Document Reproduction Service No. ED 235 786)

Segal, H. P. (1994) Future imperfect: the mixed blessings of technology in America. Amherst: The University of Massachusetts Press.

Sekhon, G. S. (1968). Differentials in perceptions of attributes of innovations by professional advocates and their clientele. Dissertation Abstracts, 30, 1245A. University Microfilms No. 69-14, 567)

Surry, D. W. (1993). The role of perceptions in the development and adoption of three computer-based learning modules. (Doctoral Dissertation, The University of Georgia, 1993). *Dissertation Abstracts International, 54* (9), 3409A - 3410A.

Twelker, P. A. (1972). *The systematic development of instruction: An overview and basic guide to the literature.* Stanford, CA: Stanford University, ERIC Clearinghouse on Educational Media and Technology. (ED 059 629)

Van Patten, J. (1989). What is instructional design? In K. Johnson & L. Foa (Eds.) *Instructional design: New alternatives for effective education and training.* New York: Macmillan.

Weinstein, S. H. (1986). Military or civilian use of instructional innovations: Is there a difference? San Francisco: National Society for Performance and Instruction. (ERIC Document Reproduction Service No. ED 271 580).

Author Notes

Daniel W. Surry, Ed.D. is Instructional Technologist, Computing, Communications & Media Services at California State University, Fresno, CA 93740-0093. Telephone: (209) 278-3923 Electronic Mail: surry@csufresno.edu.

John D. Farquhar, Ph.D. is Assistant Professor, Program of Training and Development at Pennsylvania State University, Harrisburg.