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Diffusion Theory and Instructional Technology

by

Daniel W. Surry, Ed.D.
Assistant Professor, Department of Technology Education
University of Southern Mississippi
S.S. Box 5036 Hattiesburg, MS 39406
phone: 601-266-4446 fax 601-2665957 email: dsurry@netdoor.com

John D. Farquhar, Ph.D.
Lead Instructional Designer, NovaNET Learning, Inc.
125 West Church Street, Suite 200
Champaign, IL 61820
phone: 217-378-7300 fax: 217-378-7399 email: john_farquhar-novanet@nova.novanet.org

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Abstract

This paper discusses how theories of innovation diffusion have been incorporated intoinstructional technology. The paper describes general diffusion theory and includes fourof the most commonly discussed theories of diffusion. Following this, the authors describehow general diffusion theories have been used to build diffusion theories specific toinstructional technology. The paper states that the two major categories of IT-relateddiffusion theory are Systemic Change Theories and Product Utilization Theories. The paperdescribes two opposing philosophical views of technology: Determinism and Instrumentalism.The authors use the two philosophies of technology to create two subcategories ofIT-related diffusion theory: Developer-Based Theories and Adopter -Based Theories. Theauthors contend that Developer-Based Theories are flawed in that they overstate the roleof technological superiority in the diffusion process.

Diffusion Theory and Instructional Technology

Professionals in a number of disciplines, from agriculture to marketing, have used thetheories of innovation diffusion to increase the adoption of innovative products andpractices. Instructional technologists, faced with a growing realization that innovativeinstructional products and practices have suffered from a lack of utilization, arebeginning to turn to diffusion theory in an effort to increase the adoption ofinstructional technologies. The purpose of this paper is to describe how the theory ofinnovation diffusion has been incorporated into the field of instructional technology.

Diffusion is defined as the process by which an innovation is adopted and gainsacceptance by members of a certain community. While a number of factors interact toinfluence the diffusion of an innovation, the four major factors are features of theinnovation itself, how information about the innovation is communicated, time, and thenature of the social system into which the innovation is being introduced (Rogers, 1995).Diffusion research, in its simplest form, investigates how these major factors, and amultitude of other factors, interact to facilitate or impede the adoption of a specificproduct or practice among members of a particular adopter group.

The study of diffusion theory is potentially valuable to the field of instructionaltechnology for three reasons.

First, most instructional technologists do not understand why their products are, orare not, adopted. In a very real sense, the underlying causes of instructionaltechnology's diffusion problem remain a mystery to the field. There appear to be as manyreasons for instructional technology's lack of utilization as there are instructionaltechnologists. Some blame teachers and an intrinsic resistance to change as the primarycauses of instructional technology's diffusion problem. Others (e.g., Schneberger andJost, 1994) cite entrenched bureaucracies and inadequate funding. By better understandingthe multitude of factors that influence adoption of innovations, instructionaltechnologist will be better able to explain, predict and account for the factors thatimpede or facilitate the diffusion of their products.

Second, instructional technology is inherently an innovation-based discipline. Many ofthe products of instructional technology represent radical innovations in the form,organization, sequence, and delivery of instruction. An instructional technologist whounderstands the innovation process and theories of innovation diffusion will have a morecomprehensive understanding of the discipline and be more fully prepared to workeffectively with clients and potential adopters (Schiffman, 1991).

Third, the study of diffusion theory could lead to the development of a systematic,prescriptive model of adoption and diffusion. Instructional technologists have long usedsystematic models to guide the process of instructional development (ID). These systematicID models have resulted in the design and development of effective and pedagogically soundinnovations. A systematic model of diffusion could help guide the instructional innovationprocess in a similar manner and, perhaps, with similarly effective results.

General Diffusion Theory

Before discussing how diffusion theory has been incorporated into instructionaltechnology, we will provide a brief background and overview of general diffusion theory.The most important fact to consider in discussing diffusion theory is that it is not one,well-defined, unified, and comprehensive theory. A large number of theories, from a widevariety of disciplines, each focusing on a different element of the innovation process,combine to create a meta-theory of diffusion.

The most likely reason for the lack of a unified theory of diffusion is that the studyof innovation diffusion is a fairly recent field. Rogers (1995) points out that a 1943study by Ryan and Gross at Iowa State University provided the genesis of modern diffusionresearch. The Ryan and Gross study, from the field of rural sociology, used interviewswith adopters of an innovation to examine a number of factors related to adoption. Theinterview-based methodology used in the Ryan and Gross study has remained the predominantdiffusion research methodology ever since (Rogers, 1995).

In the years since 1943, a number of researchers from rural sociology (e.g., Fliegeland Kivlin, 1962) and other disciplines (e.g., Weinstein, 1986) have built on the Ryan andGross' work to conduct studies and develop theories related to the diffusion ofinnovations. The researcher responsible for the most significant findings and compellingtheories related to diffusion is Everett M. Rogers. Rogers' book *Diffusion ofInnovations*, first published in 1960, and now in its fourth edition (Rogers, 1995) isthe closest any researcher has come to presenting a comprehensive

theory of diffusion.Four of the theories discussed by Rogers are among the most widely-used theories ofdiffusion. These widely-used diffusion theories are: Innovation Decision Process;Individual Innovativeness; Rate of Adoption; and Perceived Attributes.

The Innovation Decision Process theory (Rogers, 1995) states that diffusion is aprocess that occurs over time and can be seen as having five distinct stages. The stagesin the process are Knowledge, Persuasion, Decision, Implementation, and Confirmation.According to this theory, potential adopters of an innovation must learn about theinnovation, be persuaded as to the merits of the innovation, decide to adopt, implementthe innovation, and confirm (reaffirm or reject) the decision to adopt the innovation.This theory has been so widely cited in the instructional technology literature that Sachs(1993) writes, somewhat derisively, "after looking at [the literature] in our field,one might get the impression that the only important thing we need to know about how toencourage the adoption of innovations or how to be better change agents is that there arefive stages to the innovation adoption process (p. 1)". While Sachs correctlyconcludes that many other important theories of innovation diffusion are overlooked, theInnovation Decision Process theory remains among the most useful and well known.

The Individual Innovativeness theory (Rogers, 1995) states individuals who arepredisposed to being innovative will adopt an innovation earlier than those who are lesspredisposed. On one extreme of the distribution are the Innovators. Innovators are therisk takers and pioneers who adopt an innovation very early in the diffusion process. Onthe other extreme are the Laggards who resist adopting an innovation until rather late inthe diffusion process, if ever.

The third widely-used diffusion theory discussed by Rogers (1995) is the theory of Rateof Adoption. Rate of Adoption theory states that innovations are diffused over time in apattern that resembles an s-shaped curve. Rate of Adoption theorizes that an innovationgoes through a period of slow, gradual growth before experiencing a period of relativelydramatic and rapid growth. The theory also states that following the period of rapidgrowth, the innovation's rate of adoption will gradually stabilize and eventually decline.

The Theory of Perceived Attributes (Rogers, 1995) states that potential adopters judgean innovation based on their perceptions in regard to five attributes of the innovation.These attributes are: Trialability; Observability; Relative Advantage; Complexity; andCompatibility. The theory holds that an innovation will experience an increased rate ofdiffusion if potential adopters perceive that the innovation: 1) Can be tried on a limitedbasis before adoption; 2) Offers observable results; 3) Has an advantage relative to otherinnovations (or the status quo); 4) is not overly complex; and 5) Is compatible withexisting practices and values.

Instructional Technology Diffusion Theory

The study of innovation diffusion is neither new nor rare in the field of instructionaltechnology (IT). For example, Rogers Theory of Perceived Attributes has been used as thetheoretical basis for several studies investigating the diffusion of instructionaltechnologies. Perceptions of compatibility, complexity, and relative advantage have beenfound to play a significant role in several IT-related adoption studies. Wyner (1974) andHolloway (1977) each found relative advantage and compatibility to be significantperceptions among potential adopters of instructional technology in high schools. Eads(1984) found compatibility was the most important attribute among students and schooladministrators. Surry (1993) studied the perceptions of weather forecasters in regard toinnovative computer based training and found relative advantage, complexity andcompatibility were important adoption considerations.

In addition to being used by several researchers investigating the diffusion ofspecific instructional innovations, general diffusion theory has served as the basis fordeveloping diffusion theories specific to the field of instructional technology. It wouldbe impossible for one paper to adequately discuss in detail the techniques and purposes ofall of these attempts at theory building. Even providing a brief synopsis of each majorapplication of general diffusion theory to instructional technology would result in alengthy discussion far beyond the scope of any one paper. We will limit the present paperto a discussion of the broad goals and major philosophical premises of instructionaltechnology diffusion theory.

Macro and Micro Theories

Applications of diffusion theory to instructional technology can be grouped into twomajor categories, each with distinctly separate goals. The first major category focuses onthe reform and restructuring of educational institutions. The goal of this category ofdiffusion research is to develop theories of organizational change, most commonly schoolchange, in which technology plays a major role. Examples of this category includeReigeluth's (1987) Third Wave Educational System, The Schoolyear 2000 Model (Center forEducational Technology, 1989), and the New American Schools Development Corporation(NASDC) (Mehlinger, 1995). These theories, often referred to as systemic change theories,typically involve the adoption of a wide range of innovative technologies and practices.Because of their broad scope, systemic change theories can be thought of as macro-levelinstructional technology diffusion theories.

The second major category of instructional technology diffusion research focuses onincreasing the adoption and utilization of specific instructional products. The goal ofthis category of research is to develop theories of technology adoption that will lead toa more widespread use of instructional innovations. Examples of product adoption andutilization theories include Burkman's (1987) User-Oriented Instructional Developmentprocess, Environmental Analysis (Tessmer, 1990), Adoption Analysis (Farquhar and Surry,1994), and the Technological Imperative Model (Schneberger and Jost, 1994). Theories inthis category are not concerned primarily with large scale, systemic change, but focus onthe adoption of a specific innovation by a specific set of potential adopters. Because oftheir focus on specific innovations and specific environments, these theories are, ineffect, micro-level IT diffusion theories.

The two major categories of IT-related diffusion research, which we will call Macro, orSystemic Change Theories, and Micro, or Product Utilization Theories, can each besubdivided into two subcategories. These subcategories represent the two predominantphilosophies of technology and technological change: Technological Determinism andTechnological Instrumentalism. Before discussing the subcategories, which we will call"Developer (Determinist)" and "Adopter (Instrumentalist)", we willprovide a brief overview of the two predominant philosophies.

Determinist versus Instrumentalist

From a theoretical standpoint, views of technology range on a continuum fromtechnological determinism to technological instrumentalism. Autonomy and continuity arethe key issues in the philosophical debate between determinists and instrumentalists.Technological determinists view technology as an autonomous force, beyond direct humancontrol, and see technology as the prime cause of social change (Chandler, 1995).Determinists also view the expansion of technology as discontinuous. That is, they seetechnological growth not as a gradual, evolutionary process, but as a series ofrevolutionary leaps forward (McCormack, 1994).

Among the most widely-cited deterministic works is Alvin Toffler's (1971) book *FutureShock.* Toffler concisely outlines the determinist's philosophy when, after citingseveral examples of accelerated economic growth, he writes "behind such prodigiouseconomic facts lies that great, growling engine of change -- technology" (p. 25).While acknowledging that technology is not the only force in social change, Toffler adds,"technology is indisputably a major force behind this accelerative thrust" (p.25) and "by now the accelerative thrust triggered by man has become the key to theentire evolutionary process of the planet" (p. 485).

Technological determinists, united in their belief that technology is an autonomous andrevolutionary force, often differ in their opinion of the morality of technology.Determinists commonly have either a radically utopian or radically dystopian opinion ontechnology (Kaplan, 1996). Figure 1 provides an outline of the respective positions.

Utopian determinists believe that technology is a positive and uplifting force thatwill, over time, mitigate or eliminate most of the ills that afflict humanity. Theybelieve technology is leading society towards an ever more utopian existence. Segal (1985)writes that early technological utopian philosophers believed the growth and expansion oftechnology would bring utopia; and utopia would be a completely technological society, onerun by and, in a sense, for technology (p. 21). Karl Marx is the most often cited exampleof a utopian determinist philosopher, although the exact nature of his philosophy is ahotly debated question (Misa, 1994). Other well known, and more recent, utopiandeterminists include

Toffler and Marshall McLuhan. Within the field of instructionaltechnology, proponents of the research-development-diffusion (RDD) paradigm andinstructional development (ID) models are good examples of utopian determinists. Many ofthe most zealous advocates of RDD and ID believe the growth and expansion of instructionaltechnologies can lead to utopian (or nearly utopian) learning environments.

Dystopian determinists believe that technology is an inherently evil, or dehumanizing,force that will lead, inevitably, to the moral, intellectual, or physical destruction ofhumankind. Jacques Ellul's (1964) work *The Technological Society* is the seminalwriting in technological determinism and provides a classic outline of the dystopianposition. For example, Ellul writes [technology] destroys, eliminates, or subordinates thenatural world, and does not allow this world to restore itself or even to enter into asymbiotic relation with it (p. 79). Two well-known fictional accounts of dystopiandeterminist philosophy are the classic novels *Brave New World* by Aldous Huxley(1932) and *1984* by George Orwell (1949). A more recent and tragic example ofdystopian determinism is the Unabomber case. The Unabomber saw technology as a ruinousforce on humanity and attempted to slow technologys impact through a series of terroristattacks on scientists and technologists.

Instructional technology has numerous examples of dystopian determinists as well. Amongthe mostly cited examples are laggards who seek to delay the adoption of innovations suchas computers that have gained general acceptance in education and neo-Luddites who feartechnology will replace teachers or fundamentally dehumanize the educational process.

Philosophy of Technology	Philosophical Premise	Notable Advocates	Examples from IT
Utopian Determinism	Technology is an inevitable, autonomous force that will lead to prosperity and be the salvation of humanity	Karl Marx Marshall McLuhan Alvin Toffler	RDD Paradigm ID Models
Dystopian Determinism	Technology is an inevitable, autonomous force that is morally corrupt and will lead to the destruction of humanity	Jacques Ellul George Orwell Aldous Huxley Unabomber	Laggards "Educational Luddites"
Instrumentalism	Technology is under human control and its use can lead to beneficial or disastrous consequences	Daniel Chandler Paul Levinson Donald MacKenzie	Ernest Burkman Martin Tessmer

Figure 1. The three prevailing views of technology and theirrelationships to instructional technology.

Opposed to the determinist philosophers are the instrumentalist philosophers. Humancontrol over technology is the issue that most dramatically divides instrumentalphilosophers and determinist philosophers. Technological instrumentalists, as their namemay imply, view technology as a tool. The instrumentalists often cite the knife as anexample of their philosophy (Levinson, 1996). A knife is a tool that can be used foreither good or evil, depending upon the intentions of the person employing the tool.Extrapolating from that simple example, instrumentalists believe that all technology is atool, largely under human control, that can be used for either positive or negativepurposes.

While determinists see technology as the most powerful force for change,instrumentalists see social conditions and human aspiration as the primary causes ofchange. The other major difference between the two philosophies is that instrumentalistsview the growth of technology as an evolutionary process, not as a series of revolutionsor technological leaps (Levinson, 1996). Heilbroner (1972) equates technological advanceto natural evolution (a common theme in instrumentalist writing) when he states that mostadvances, particularly in retrospect, appear essentially incremental, evolutionary...ifnature makes no sudden leaps, neither, it would appear, does technology (p. 31).Instrumentalists see

technological growth as the ultimate culmination of a long history ofslow, gradual expansion. We will provide examples of how instrumentalist philosophy hasbeen incorporated into instructional technology (e.g., Burkman, Tessmer) later in thispaper.

As mentioned above, the two major categories of IT-related diffusion research can besubdivided into two subcategories based on their philosophical view of technology. Theresult is a breakdown of IT-related diffusion theory into four areas. The areas are shownin Figure 2. We will now describe the two subcategories, Developer-Based andAdopter-Based, in more detail.

PHILOSOPHY	GOAL: Systemic Change (Macro)	GOAL: Product Utilization (Micro)
Developer (Determinist)	Focus on the structure and establishment of an effective organizational framework.	Focus on process of designing, developing, and evaluating effective instructional products
Adopter (Instrumentalist)	Focus on the social, political, and professional environment in specific organizations	Focus on the needs and opinions of potential adopters and characteristics of the adoption site.

Figure 2. Overview of Instructional Technology DiffusionTheories showing diffusion goal and philosophical view.

Developer-Based (Determinist) Theory

The goal of developer-based theory is to increase diffusion by maximizing theefficiency, effectiveness and elegance of an innovation. Developers-based theories focuson the technical characteristics of an innovation in order to increase difusion. Thedeveloper, or architect, of superior technology is seen as the primary force for change.The underlying assumption of developer-based theories is deterministic because they implythat technological products and systems will, by virtue of their superiority alone,replace inferior products and systems. Developer-based theories of diffusion see change asfollowing directly from a technological revolution or quantum leap.

Developer-based theories in instructional technology assume that the best way to bringabout educational change is to create a system or product that is significantly,quantifiably superior to existing products or systems. Potential adopters are viewed asbeing predisposed to adopt innovations that are quantifiably superior. Top down schoolreform efforts such as the Goals 2000 initiative (Mehlinger, 1995) are excellent examplesof developer-based IT diffusion theories. These top down reform efforts seek to diffuseeducational change by proposing educational systems that are superior to existing systems.By specifying goals, organizational structures, managerial philosophies, instructionalproducts, and fiscal strategies that have been proven to be, or at are least theorized tobe, superior to existing practice, top down school reformers are counting on technologicalsuperiority to bring about change.

Instructional development (ID) models are another example of developer-based theoriesof diffusion. Diffusion is not an element overtly described in a typical ID model (Andrewsand Goodson, 1991), but the adoption of an innovation does have an implied place in the IDprocess.

Diffusion through technological superiority is the implicit goal of the process.Andrews and Goodson (1991) list four purposes of systematic instructional design: Improvedlearning; improved management (of the ID process); improved evaluation (of products); andtheory building. Three of the four purposes center on the creation of technologicallysuperior products.

The instructional development process assumes that technological superiority is asufficient condition that will lead directly to the adoption and diffusion of innovativeproducts and practices.

Limitations of Developer Based (Deterministic) Theories

Instructional development is a process based on the research, development, anddiffusion (RDD) paradigm (Burkman, 1987). Saettler, in the first edition of is classicwork *A History of Instructional Technology* (1968) provides an insight into thethinking of those who were early advocates of the RDD approach when he writes:

> In the education sector, it is becoming increasingly apparent to scientifically oriented educators that education must discard the folklore approach to instruction and move forward to new frontiers, this includes the development of instructional systems based on behavioral science theory, research, and development. (p. 270).

As Saettler describes, one of the hallmarks of the RDD approach is to abandon"folklore" approaches to education and, in their place, to develop systematic,scientific alternatives. Saettler writes that the systems engineering approach has beenthe foundation of industrial engineering since the beginning of the industrial revolutionand that "one of the most successful applications of the systems concept . . .was thedevelopment of the atomic bomb" (p. 269).

While there can be ethical debate as to whether the same process used to develop theatomic bomb should be used to develop human minds, there can be little argument that thecontinuing refinement and wider use of the RDD paradigm have resulted in the creation ofinstructional products that are pedagogically sound and technically advanced.Instructional technology's greatest challenge, therefore, is not developing effectiveproducts, but developing effective products that people want to use. Hall and Hord (1987)point to the failure of many large-scale curriculum reform projects in the 1960s asevidence that instructional technology has failed to meet the challenge of utilization. AsDalton (1989) writes, "although we can fill instructional gaps with fervor, we neverseem to examine our solutions in light of the wants of the implementors" (p. 22).

The primary limitation of instructional development theory, and the RDD paradigm uponwhich it is based, is their inherent deterministic bias. There is a general consensus inthe diffusion and adoption literature that technological superiority alone is not enoughto guarantee the adoption of an innovation. In fact, some would argue whethertechnological superiority is even a necessary condition for widespread diffusion, at leastat the beginning of the adoption process (MacKenzie, 1996). If technological superiorityis not sufficient to increase adoption, where does that leave us? Several instructionaltechnologists suggest that the ultimate answer to this important question can be found ina more instrumentalist approach to diffusion.

Adopter Based (Instrumentalist) Theory

Adopter-based theories focus on the human, social, and interpersonal aspects ofinnovation diffusion. Adopter based theories are inherently instrumental in philosophybecause they view the end user, the individual who will ultimately implement theinnovation in a practical setting, as the primary force for change. These theories rejectthe assumption that superior products and practices will automatically be attractive topotential adopters.

Segal (1994) states the importance of adopter based theories when he writes "allstructures and machines, primitive or sophisticated, exist in a social context and, unlessdesigned for the sake of design itself, serve a social function" (p. 2).Adopter-based theories seek to understand the social context in which the innovation willbe used and the social function the innovation will serve. Tenner (1996) describes theconcept of revenge effects which is central to many adopter-based theories. Revengeeffects occur when "new structures, devices, and organisms react with real people inreal situations in ways we could not foresee" (p. 9). Predicting and accounting forprobable revenge effects caused by an innovation is a defining component of manyadopter-based diffusion theories.

Adopter-based theorists (e.g., Tessmer, 1990) argue that a variety of factors, mostunrelated to technical superiority, influence the decision to adopt or reject aninnovation. Adopter-based theorists such as Burkman (1987) often site the QWERTY andDvorak keyboard example.

The Dvorak keyboard configuration was shown in early studies to allow for moreefficient and rapid typing. However, since most typists learned to type using the QWERTYconfiguration and are comfortable with that configuration, there is great reluctance toadopt the Dvorak configuration, despite its greater efficiency. This is a classic exampleof how human, interpersonal, and social factors often play a more significant role inadoption than technological superiority.

Examples of adopter-based theories can be found in both the Macro and Micro categoriesof IT diffusion research. Ernest Burkman (1987) was the first major author in the field tosuggest a Micro (Product Utilization) theory based on an instrumentalist view ofinstructional technology.

Burkman's theory of a user-oriented instructional development (UOID) rejects the ideathat technological superiority is a sufficient condition for the adoption of aninstructional product. In UOID, the opinions, needs, and perceptions of the potentialadopters are seen as the primary forces that influence adoption.

Burkman's User Oriented Instructional Development process consists of 5 steps each ofwhich is concerned about the characteristics of the individual adopter:

1. Identify the potential adopter
2. Measure relevant potential adopter perceptions
3. Design and develop a user-friendly product
4. Inform the potential adopter (of the product's user-friendliness)
5. Provide Post Adoption Support

Burkman's UOID is representative of instrumentalist philosophy because UOID assumes theend user is the most important force in the adoption of a new product.

A product utilization approach also resulted from research conducted at the Universityof Minnesota's Telecommunications Development Center. This research led to the design of atechnology adoption process that considers the interface between the need, user, content,and organization (Stockdill and Morehouse, 1992). The process involves identifying factorsof a new educational technology *following* a complete analysis of the educationalneed and user characteristics. The Stockdill and Morehouse model recognizes the criticalroles of the user and organization in product adoption and recommends a process ofselecting appropriate products.

Tessmer (1991) emphasizes the social factors of implementing an instructional productwithin the context of its use. He proposes the use of an analysis procedure to ensure thata product "is actually used, correctly used, and continually used" (p. 9).Conducting such an Environment Analysis involves identifying the physical and use factorsof both the instructional and support situations. Tessmer recommends analyzing theenvironment as a unique stage of front-end analysis contributing critical adoptioninformation.

Furthering a Micro (Product Utilization) perspective of the instrumentalist philosophyis an approach called Adoption Analysis (Farquhar and Surry, 1994). Similar to theEnvironment Analysis procedure, this process takes a slightly broader approach inconsidering adoption factors from the perspectives of both users and organizations. Theend result of an Adoption Analysis is an effective implementation plan that specifies aprocess of successful adoption. Key decisions throughout the design and development of theproduct will also likely be impacted by the analysis of user-perceptions andorganizational-attributes.

Hall and Hord's (1987) Concerns Based Adoption Model (CBAM) is a notable example of aMacro (Systemic Change) theory of diffusion that is instrumentalist, rather thandeterminist, in philosophy. Hall and Hord describe a process in

which change facilitatorsunderstand change from the point of view of the people who will be affected by change. Theidea of CBAM is to bring about systemic restructuring by understanding the social,political, and interpersonal aspects of the school. The Coalition of Essential Schools,and many other Bottom Up reform strategies (Mehlinger, 1995), are other examples ofadopter based, systemic change theories.

PHILOSOPHY	GOAL: Systemic Change (Macro)	GOAL: Product Utilization (Micro)
Developer (Determinist)	Top Down Reform NASDC Goals 2000	ID Models Needs Assessment Formative Evaluation Summative Evaluation
Adopter (Instrumentalist)	Bottom Up Reform CBAM Coalition of Essential Schools	Burkman's UOID Environment Analysis Adoption Analysis Stockdill & Morehouse

Figure 3. Major theories representative of each of the fourareas of instructional technology diffusion research

This section described the incorporation of diffusion theory into the field ofinstructional technology in ways both subtle and overt. The goal of a diffusion theory ininstructional technology can be the total restructuring of an entire instructional systemor the adoption of a specific instructional product by a specific group. In addition,theories of adoption and diffusion can represent either a determinist or instrumentalphilosophy. Figure 3 shows examples of instructional technology diffusion theories in eachof the four resulting areas.

Conclusions and Recommendations

Instructional technology is a broad and diverse field incorporating theories from,among others, the fields of communication, cognitive psychology, management, computerscience and behavioral psychology. This paper has demonstrated that instructionaltechnologists have begun to study and apply the theories of innovation diffusion. Anincreased awareness and expanded use of diffusion theories are of potentially greatbenefit to instructional technology.

The Developer-Based or Determinist philosophy of innovation diffusion has dominatedinstructional technology processes and perspectives. Instructional technologists havelargely been seduced by the simplicity and basic logic of technological determinism. Thedecision to adopt an innovation, however, often defies simple logic. Successful productsmust meet a myriad of considerations beyond simple instructional effectiveness or userwants. As MacKenzie (1996) writes: "Technologies . . . may be best because they havetriumphed, rather than triumphing because they are best" (p. 7).

In order to maximize the potential benefit of diffusion theory, we encourage theacceptance of increased instrumentalist philosophy and Adopter-Based approaches. Noreasonable diffusion theorist (nor instructional technologist) would suggest thattechnological superiority is the only necessary condition for diffusion. Yet, we oftenfail to implement approaches that consider other key factors.

Superior technology does not always steam roll inferior technology, as the deterministsbelieve. Nor does a superior technology explode onto the scene in a glorious, perfect form-- it creeps along in fits and starts. Technology's advance may be inevitable, but it isgradual. Instructional technologists should, therefore, look to the potential adopters toshow us

ways to gradually introduce our innovations into their societies.

Of course, while a less determinist philosophy would be beneficial to instructionaltechnology, a totally instrumentalist philosophy would be disastrous. Turning outtechnically inferior and pedagogically weak products that people want to use is not theanswer. Every technologist is inherently a determinist. There is no danger in being drivento improve society by improving instructional technology. The danger is to ignore thesociety we are attempting to improve.

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