



**Diffusion of Innovations and
Science-Based Practices to
Address Barriers to Learning
& Improve Schools:**

**A Series of Information
Resources on
Enabling System Change**

As calls for addressing barriers to student learning and improving schools increase, new directions are imperative. And, this involves more than tinkering with prevailing approaches. The need is for developing major innovations (e.g., comprehensive school-level prototypes) and taking them to scale throughout a school district.

The success of all this depends on stakeholders in public education becoming more knowledgeable about the complexities and strategies related to diffusion of innovations, enabling major systemic changes, and developing a *sophisticated* understanding of the role of empirically-based practices.

To these ends, the Center is producing a series of resources, such as this one, to provide informational aids for use as tools in policy and practice analyses, research, education, and school improvement planning.

**Brief Overview of Major Concepts from
E.M. Rogers' Work on Diffusion of Innovations**

What follows are a selected set of concepts presented by Rogers in his oft-cited book entitled *Diffusion of Innovations* (initially published in 1962). We have chosen concepts which may be particularly helpful as an introduction to those concerned with diffusion of innovations and science-based practices into school settings. We also highlight some concerns related to Rogers' conceptualization using the example of recent work by Greenhalgh and his colleagues (2004).

Rogers, E.M. (2003) *The diffusion of innovations*, fifth edition. New York: The Free Press.

Greenhalgh, T.; Robert, G.; MacFarlane, F.; Bate, P. & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: Systematic review and recommendations. *The Milbank Quarterly*, 82, 581-629.

In his work, Everett M. Rogers views diffusion of innovation as “a special type of communication concerned with the spread of messages that are perceived as new ideas.” Communication in this context is defined as “a process in which participants create and share information with one another in order to reach a mutual understanding.”

Main Elements of the Diffusion Process

Rogers defines *diffusion* as the process by which (1) an *innovation* (2) is *communicated* through certain *channels* (3) *over time* (4) among the members of a *social system*. Thus, he stresses that all diffusion of innovations involves four main elements: (1) the innovation, (2) communication channels, (3) time, and (4) a social system. He cautions that it should not be assumed that diffusion of an innovation is always desirable.

Four Main Elements Defined

Innovation: An idea, practice, or object that is perceived as new by an individual or other unit of adoption. (If it is *perceived* as new, it is defined as an innovation.)

Communication channels: The means by which messages get from one individual to another. The nature of the information exchange relationship between a pair of individuals determines the conditions under which a source will or will not transmit the innovation to the receiver and the effect of such a transfer. “Mass media channels are more effective in creating knowledge of innovations, whereas interpersonal channels are

more effective in forming and changing attitudes toward a new idea.”

Time: The temporal dimension is measured related to (1) the interval from first knowledge of an innovation through adoption or rejection, (2) the relative earliness or lateness of adoption, and (3) rate of adoption in a system (e.g., number of members of a system who adopt the innovation in a given period of time).

Social System: A set of interrelated units that are engaged in joint problem solving to accomplish a common goal.

Rogers describes the innovation-decision process as a five step “process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to the formation of an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision.” He states that the process is more complicated in system decision making because a number of individuals are involved.

“The process consists of a series of choices and actions over time through which an individual or system evaluates a new idea and decides whether or not to incorporate the innovation into ongoing practice. This behavior consists essentially of dealing with the uncertainty that is inherently involved in deciding about a new alternative to an idea previously in existence. The perceived newness, is a distinctive aspect of innovation decision making (compared to other types of decision making).”

Five Steps of the Innovation-Decision Process

Diffusion of Innovations Among Individuals

1. Knowledge: An individual finds out that an innovation exists and gains some understanding or how it functions. One way an individual may gain knowledge of an innovation is by identifying a problem and then actively seeking information about innovations that may solve it. Hearing about an innovation may also create needs within an individual that they had not previously identified.

2. Persuasion: Individual forms a favorable or unfavorable attitude about an innovation.

3. Decision: Individual engages in activities that lead to a choice to adopt or reject. The person may decide to fully adopt or use a trial version.

4. Implementation: An innovation is put into use. Changes may be made (e.g., to better fit a situation). The degree to which changes are made by a user during adoption and implementation is called *re-invention*

5. Confirmation: Reinforcement is sought for an innovation decision. The decision may be reversed when there are conflicting messages about the innovation. Is it not solving the identified problem? Are there any unintended consequences? At this stage, individuals are seen as seeking to avoid a state of dissonance.

Innovation champions: The presence of champions contributes to innovation success. A champion is defined as a charismatic individual who throws support behind an innovation to help overcome indifference or resistance. May be powerful persons in the organization or lower-level individuals who are able to affect the actions of others.

Diffusion of Innovations Among Organizations

Rogers defines an organization as “a stable system of individuals who work together to achieve common goals through a hierarchy of ranks and a division of labor.” He divides organizational diffusion of innovation into two subprocesses: initiation and implementation.

Initiation: Everything that occurs within an organization before an innovation is adopted (e.g., information gathering, conceptualizing, planning). This is divided into two substages:

1. Agenda-Setting: Decision-making bodies within the organization perceive a problem that needs to be addressed

2. Matching: An agenda problem is addressed with an innovation that is perceived to fit.

Implementation: Everything that is involved in putting the innovation into use. This is divided into three substages:

3. Redefining/Restructuring: The innovation is re-invented to accommodate both the organization (e.g., needs, structure) and the innovation. For example, if a school initiates a new drug prevention program, new staff may be hired or existing staff members’ job duties may change. At the same time, the school may change certain aspects of the drug prevention program to better fit its unique situation.

4. Clarifying: People within the organization become more familiar with the innovation, and it acquires meaning within the context of the organization.

5. Routinizing: At this point in the innovation diffusion process, the innovation loses its “newness” and becomes a part of the organization’s everyday functioning. (Sustainability is a closely related concept.)

Characteristics of Innovations

Rogers states that the characteristics of an innovation, as perceived by the members of a social system, determine its rate of adoption. Five attributes are identified:

- 1. Relative Advantage:** “the degree to which an innovation is perceived as better than the idea it supercedes. ... The greater the degree of perceived relative advantage ..., the more rapid its rate of adoption....”
- 2. Compatibility:** “the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and the needs of potential adopters.” The more compatible it is, the more rapidly it will be adopted.
- 3. Complexity:** “the degree to which an innovation is perceived as difficult to understand and use.” Ideas that are simpler to understand are adopted more rapidly than those that require development of new skills and understandings.
- 4. Trialability:** “the degree to which an innovation may be experimented with on a limited basis. ... An innovation that is triable represents less uncertainty ... as it is possible to learn by doing.”
- 5. Observability:** “the degree to which the results of an innovation are visible to others. The easier it is for individuals to see the results ..., the more likely they are to adopt.”

Rogers provides examples and discusses the mechanisms related to each attribute.

S-Curve

Rogers describes how innovations are an “S-curve” phenomenon – starting slowly, then (if they catch on) quite rapidly, and then leveling off as they become routine. He notes, however, that the slope varies in steepness depending on the rapidity of the diffusion. He also notes that different information sources are important at different stages of the diffusion process. For example, mass media channels are effective at making people aware that an innovation exists; however, social networks are more important in persuading people to adopt innovations and helping them use the innovations correctly. Change agents also have different functions at different stages of the innovation process. First, they try to build positive relationships, help assess needs and problems, and create awareness of potential innovations that can solve these problems. Later, they provide the technical assistance necessary to implement innovations effectively. The most effective change agents are seen as those who help build up enough resources to sustain the innovation without their ongoing assistance.

Adopter Categories and Variables Affecting Rate of Adoption in Individuals and Organizations

Adopter Categories

Rogers divides adopters into five categories, depending on how quickly each type of person adopts an innovation. In general, people who adopt innovations earlier have more social connections outside of their local social system, more money, more exposure to mass media, and more education. According to Rogers:

1. **Innovators** constitute about 2.5% of the population. They tend to be outsiders within their local social system but communicate with many people outside of it. They also have the financial and mental resources to cope with risk, as well as significant technical knowledge.
2. **Early Adopters** make up about 13.5% of the population. They tend to be opinion leaders within their local social systems. Early adopters tend to have extensive networks within their local social system as well as a number of connections to people outside it. They also have the financial and mental resources to cope with risk.
3. **Early Majority** make up about 34% of the population. While members of the early majority do not tend to be opinion leaders within their community, they do have extensive social networks within their local social system.
4. **Late Majority** also make up about 34% of the population. Members of the late majority tend to adopt innovations when they become social or economic necessities. Members of the late majority tend to have fewer financial resources and less education than other members of the population.
5. **Laggards** make up about 16% of the population and tend to adopt innovations later than anyone else in their local social systems. Laggards have limited social networks and financial resources and place a high value on tradition.

Structural Characteristics and Organizational Innovativeness

Rogers states that innovativeness is related to (a) individual (leader) characteristics, (b) internal organizational structural characteristics, and (c) external characteristics of the organization. With respect to internal organizational structural characteristics, he identifies the following:

1. **Centralization:** the degree to which power and control are concentrated in the hands of a few key players. This makes it more difficult for organizations to adopt innovations.
2. **Complexity:** the degree to which an organization's members possess a relatively high level of knowledge and expertise (e.g., a range of specialties and degrees of professionalism). This enhances an organization's ability to grasp the value, but may make it difficult to arrive at consensus.
3. **Formalization:** the degree to which an organization emphasizes rules and procedures. This inhibits consideration of innovation but, once adopted, encourages implementation.
4. **Interconnectedness:** the degree to which the units in a social system are linked by interpersonal networks. When new ideas can be communicated freely with many other members, innovations tend to be adopted more quickly.
5. **Organizational Slack:** the degree to which uncommitted resources are available to an organization. These can be devoted to tasks that are not central to the organization's day-to-day survival. Organizations with more slack resources can adopt innovations more quickly.
6. **Size:** Larger organizations have more resources with which to adopt innovations.

However, Rogers pointed out that none of the variables listed below explain large amounts of variance between organizations and that the same characteristics that make it easier for an organization to initially adopt an innovation may make it difficult to implement that innovation effectively throughout the system.

Diffusion of Innovations Theory: Ever-Changing

As Rogers recognizes, there have been critiques of his formulations, and diffusion of innovation theory is a growing and changing entity. For instance, Greenhalgh et. al (2004) have critiqued Rogers' focus on innovator characteristics and instead choose to emphasize the contextual and dynamic nature of the innovation process. They have also suggested additional characteristics of innovations and contextual influences that impact how quickly an innovation is adopted. Below, for example, are their categorizations of key innovation attributes and system readiness factors affecting adoption.

Attributes of the Innovation

- 1. Risk:** When it is not clear whether or not an innovation will work or whether it will have unintended negative consequences, it is less attractive to potential adopters.
- 2. Task Issues:** Innovations that directly address an adopter's work and needs (e.g., to increase productivity) are more likely to be adopted.
- 3. Knowledge Required to Use It:** Innovations that a variety of people can understand and that can work in a large number of contexts are more likely to be adopted.
- 4. Augmentation/Support:** When adopters are provided with adequate technical assistance in how to use an innovation, it is more likely to be adopted successfully.

System Readiness for Innovation

- 1. Tension for Change:** Organizations that have identified an important problem are more likely to seek out and use innovations that address that problem.
- 2. Innovation-System Fit:** Innovation-system fit is similar to the concept of compatibility. Compatibility refers to how well an innovation jives with individual consumers' values and lifestyles, while innovation-system fit refers to how well the innovation jives with organizational values and structure.
- 3. Assessment of Implications:** Organizations that have spent a significant amount of time planning for the adoption of an innovation, including addressing potential problems that may arise from implementation, are more likely to adopt successfully.
- 4. Support and Advocacy:** Innovations that have a wide base of support within an organization, as well as high-ranking organization members backing it, are more likely to be adopted successfully.
- 5. Dedicated Time and Resources:** Innovations that get enough time and money devoted to their adoption and implementation tend to be adopted more successfully.
- 6. Capacity to Evaluate the Innovation:** An organization's ability to evaluate the implementation of an innovation is crucial to whether or not it will be implemented successfully.

6A Few Other Related Center Documents and Publications

Systemic Change for School Improvement: Designing, Implementing, and Sustaining Prototypes and Going to Scale. Online at
<http://smhp.psych.ucla.edu/pdfdocs/systemic/systemicreport.pdf>

Toward a Scale-Up Model for Replicating New Approaches to Schooling. Online at
<http://smhp.psych.ucla.edu/publications/06%20toward%20a%20scale%20up%20model%20for%20replicating%20new%20approaches.pdf>

Scaling-Up Reforms Across A School District. Online at
<http://smhp.psych.ucla.edu/publications/21%20SCALING-UP%20REFORMS%20ACROSS%20A%20SCHOOL.pdf>

Organization facilitators: A change agent for systemic school and community changes.
<http://smhp.psych.ucla.edu/pdfdocs/Report/orgfacrep.pdf>

On Sustainability of Project Innovations as Systemic Change. Online at
<http://smhp.psych.ucla.edu/publications/45%20on%20sustainability%20of%20project%20innovations%20as%20systemic%20change.pdf>

Systemic change for school improvement. Online at:
<http://smhp.psych.ucla.edu/publications/Systemic%20Change%20for%20school%20improvement.pdf>

New Initiatives: Considerations Related to Planning, Implementing, Sustaining, and Going-to-Scale. Online at <http://smhp.psych.ucla.edu/pdfdocs/briefs/sustainbrief.pdf>

Sustaining School and Community Efforts to Enhance Outcomes for Children and Youth: A Guidebook and Tool Kit. Online at <http://smhp.psych.ucla.edu/pdfdocs/sustaining.pdf>

Getting From Here to There: A Guide book for The Enabling Component. Online at
<http://smhp.psych.ucla.edu/pdfdocs/enabling/gettingfromhere.pdf>

The Center's Series of Information Resources on Enabling System Change

Diffusion of Innovations and Science-Based Practices to Address Barriers to Learning & Improve Schools

- >Brief Overview of a Major Review by L.W. Green, et al. (2009) entitled: Diffusion Theory and Knowledge Dissemination, Utilization, and Integration in Public Health
- >Brief Overview of Major Concepts from E.M. Rogers' Work on Diffusion of Innovations
- >Brief Overview of Malcolm Gladwell's Concept of the Tipping Point
- >Some Key Terms Related to Enabling System Change
- >Systemic Change for School Improvement
- >Change Agent Mechanisms for School Improvement: Infrastructure not Individuals
- >System Change and Empirically-Supported Practices: The Implementation Problem
- >Policy Implications for Advancing Systemic Change for School Improvement
- >Some Key References Related to Enabling System Change
- >Dissemination Focused on Diffusion: Some Guidelines
- >Diffusion: In Pursuit of Action
- >Excerpts from Child Trends' series of Research-to Results Briefs on Adopting, Implementing, Sustaining, and Replicating Evidence-Based Practices
- >Making and Disseminating Recommendations is Not Sufficient
- >Intro to Multi-Level Community Based Culturally Situated Interventions