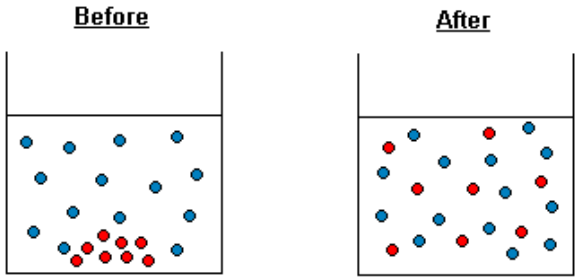
Innovation

An innovation is an idea, practice, or technology perceived as new.

Diffusion Described…

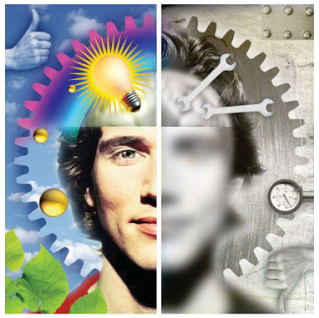


- *Diffusion in a liquid or gas is the random motion of particles from areas of high concentration to areas of lower concentration.*
- *Diffusion models attempt to estimate the spread of an idea, product, method, etc., through a given population.*
- *Successful diffusion depends on Sustainability, Scalability, and Replicability.*

Educational Innovations come and go…

- Student-Centered Discovery & Inquiry Learning
- Professional Learning Communities
- Site-Based Management
- ITIP (Instructional Theory into Practice)
- Educational Radio, TV, Film
- MOOCS, Distance Education

A Ubiquitous Innovation that Came and Went…



- ITIP (Instructional Theory Into Practice).
- Dr. M. Hunter, Principal of UCLA Laboratory School.
- Dr. Hunter proposed an 8-step teaching plan based on motivation, transfer, etc. She called it ITIP.
- By the1970's/80s/90s ITIP was the dominant template in teacher training, teacher hiring, teacher assessment. Near market saturation. The largest-scale innovation in modern educational history.
- An early study (1972): NO academic difference. Hunter criticized its faulty design.
- In 1989, Robert Slavin of Johns Hopkins wrote an article showing that ITIP showed no statistical evidence of academic superiority over other methods.
- ITIP disappeared rapidly. Today young teachers have never heard of it.

A Lesson from History and Fable: Henny Penny didn't know that thinking doesn't make things so…

- *"We sometimes pretend something is true not because there's evidence for it but because we want it to be true."*

  Carl Sagan

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Levels of Educational Innovation…

- Level 1: Theory and/or Philosophy
- Level 2: Empirical Research
- Level 3: Implementation and Practice

Level 1: Theoretical Beginnings of "Cooperative Learning" Innovation

- Gestalt Theory of Late 1800s. Max Wertheimer & Wolfgang Kohler. Perception as product of complex interaction.

- Group Dynamics Theories of mid 20th Century. Kurt Lewin & Morton Deutsch. Behavior as function of person and environment. B=*f*(p,e)

Level 2: Empirical Cooperative Learning Research in School Settings

D. Johnson & R. Johnson University of Minnesota studies in Alternative Goal Structures: Cooperative, Competitive, and Independent. (1970s-present)

Robert Slavin Johns Hopkins University studies in Structured Team Learning and Informal Group Learning. (1970s-present)

Level 3: Cooperative Learning Applied Practice: Kdgn-University, Classroom and Online

- 1. Positive Interdependence
- 2. Individual Accountability
- 3. Equal Participation
- 4. Simultaneous Interaction

- EFFECT SIZE (see John Hattie) 0.41to 0.59

Cooperative Learning: A Sustaining Innovation

- Today Cooperative Learning is a regular part of classroom-based and online learning practice.
- Professor Bruce Joyce, a leading American educator, claims the evidence is so clear that teachers who do not use cooperative learning should be sued for malpractice.

Nature of Innovations…

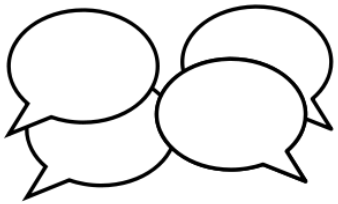
- HARDWARE, or the tool that embodies the technology (Chalk, Paper & Pen, Printing Press; Loud Speaker, Radio, Film, TV, Computer)
- SOFTWARE, or the medium for using the tool effectively (Books, Printed Material, Web Sources)
- PEDAGOGICS, or the methods used to facilitate teaching and learning (inquiry, feedback, reflection, project learning)

Rogers' Diffusion of Innovations…

- Relative Advantage compared to present practice?
- Compatibility with existing norms & values?
- Complexity/Simplicity: How easy to implement?
- Trialabality: What result does practice show?
- Observability: How visible is the innovation?

Communication Channels through which Innovations are Diffused

- Media which are used to communicate knowledge of the innovation, including professional journals, advertising.

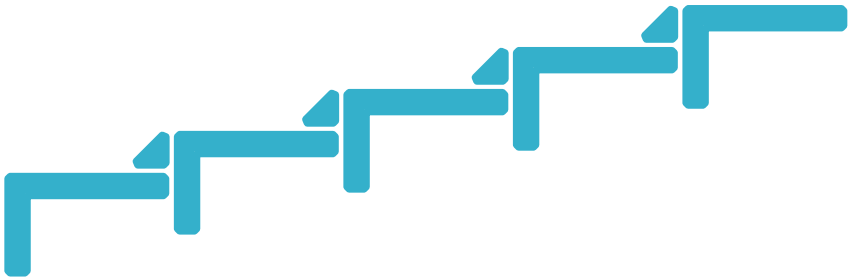


- Interpersonal Communication, which is more effective in changing attitudes, e.g., conferences, conventions, formal classes, workshops, word of mouth.

- Classroom and School Practice, whether in person or through distance teaching/ learning.

Innovation Adoption Stages…

- Innovators: 2.5%
- Early Adopters: 13.5%
- Early Majority: 34%
- Late Majority: 34%
- Laggards: 16%



Social System Implementation…

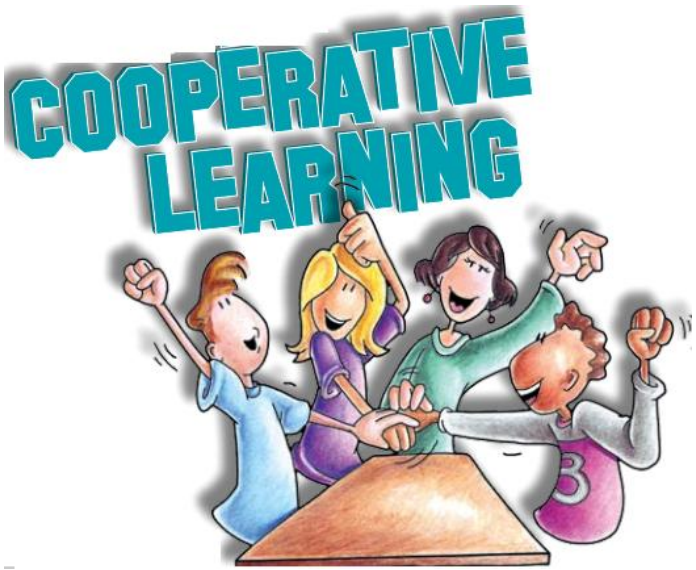
- Change Agents who attempt to persuade through top-down or grass roots methods.
- Norms (social structure) or behavior patterns of the members of the social system

Where Do Educational Innovations Come From?

- Technologies

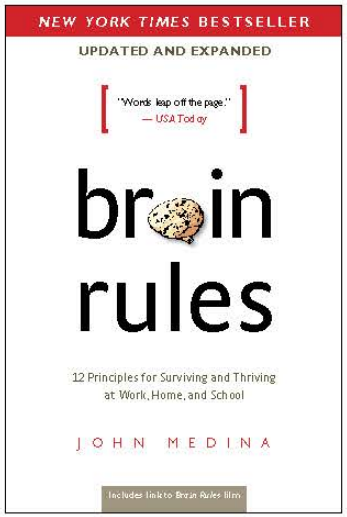
Where Do Educational Innovations Come From?

- Teaching/Learning Theories



Where Do Educational Innovations Come From?

- Brain Science Research



The Brain Rules

survival
The human brain evolved, too.

memory
Repeat to remember.

exercise
Exercise boosts brain power.

sensory integration
Stimulate more of the senses.

sleep
Sleep well, think well.

vision
Vision trumps all other senses.

stress
Stressed brains don't learn the same way.

music
Study or listen to boost cognition.

wiring
Every brain is wired differently.

gender
Male and female brains are different.

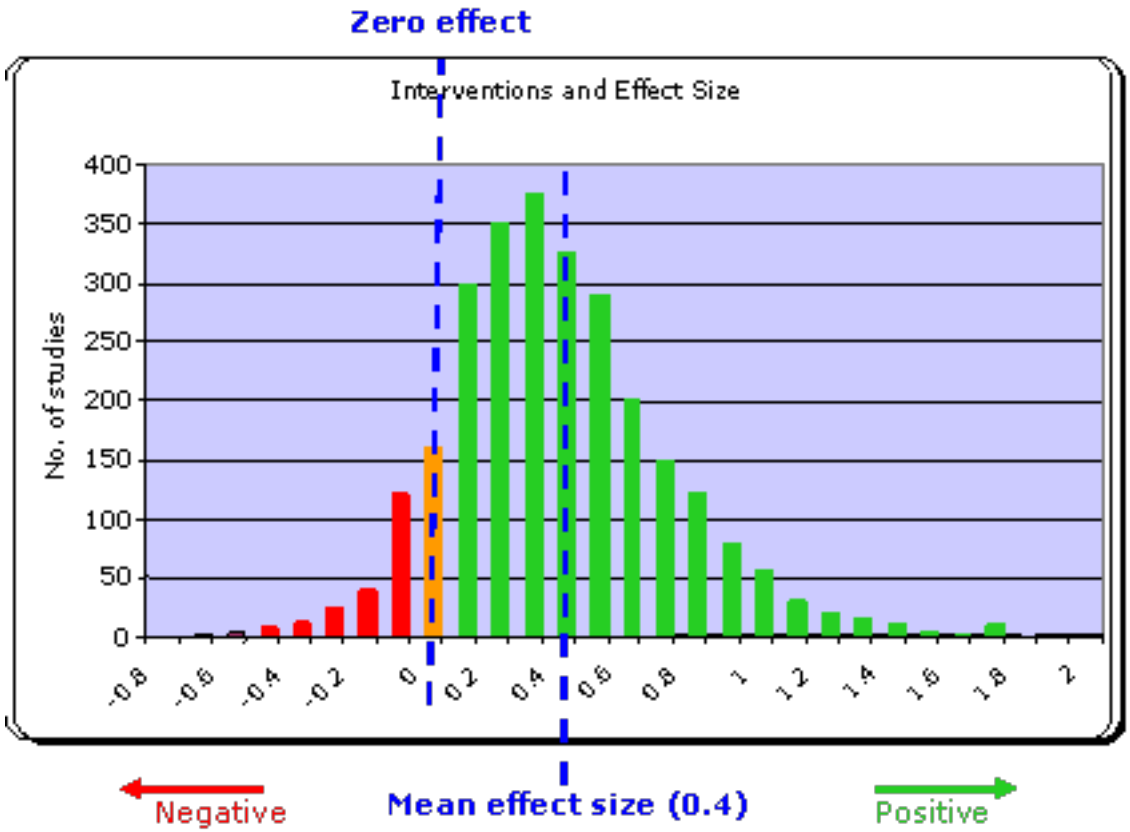
attention
We don't pay attention to boring things.

exploration
We are powerful and natural explorers.

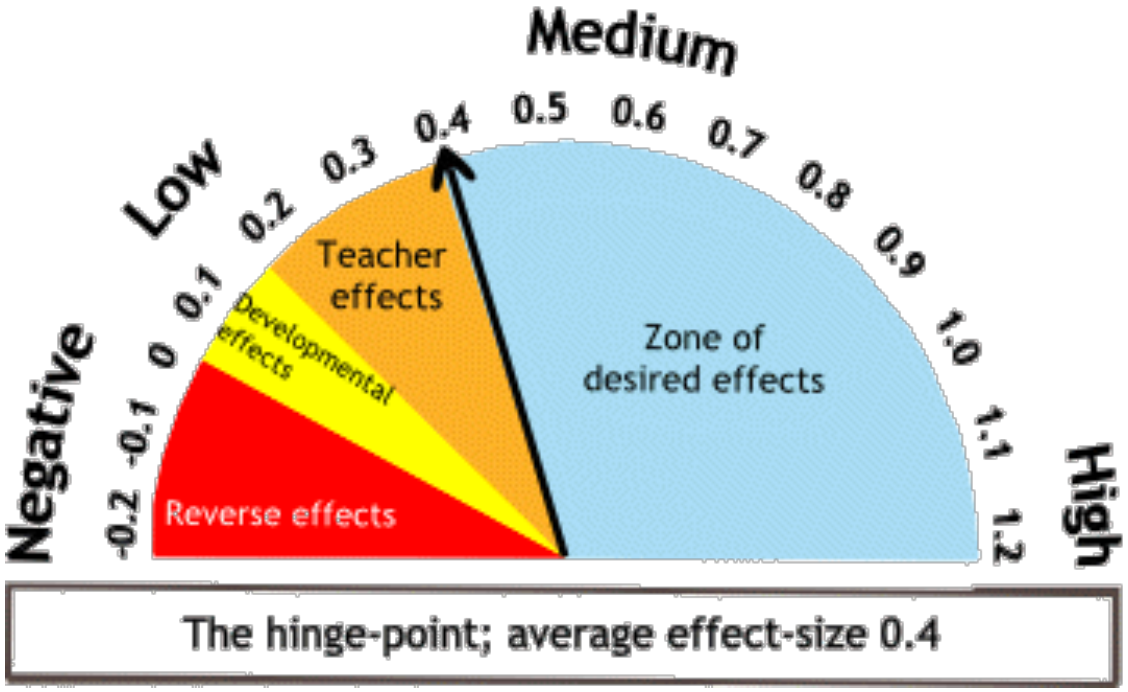
Assessing Innovations

- Empirical Assessments (controlled experiments)
- Program Evaluations (level & success of implementation)
- What Works (feasibility & measurements)
- Perceived Value (who benefits?)
- Long-term Acceptance (standard practice)

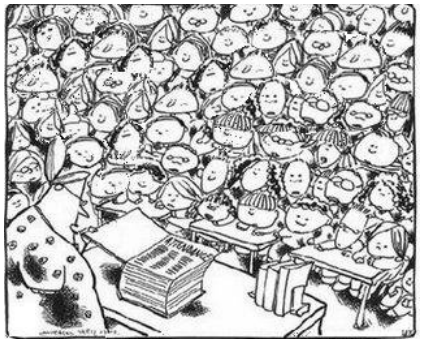
Innovation & Effect Size



Desired Learning Outcomes Occur with Effect Size of .40+



Impracticality of Certain Innovations…



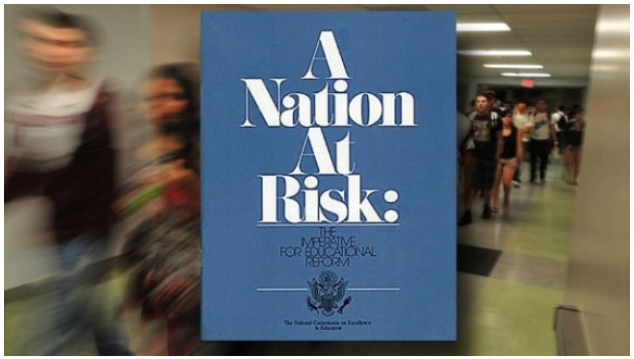
- Reducing Class Size from 25 to 15 results in an Effect Size of .40 However, to make such a change would require twice as many teachers, classrooms, etc.

- Year Around Schools utilize buildings during summer and holidays that would otherwise be empty. 1)There is no evidence that this innovation raises academic achievement; 2) Tradition of summer holidays is difficult to change.

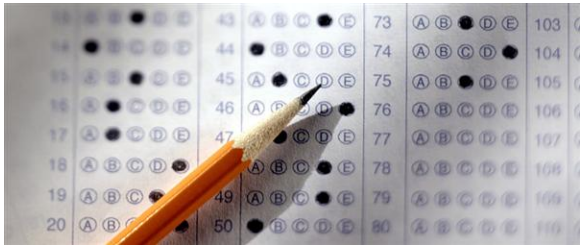
Standardized Testing: A Top-Down Attempt at Educational Innovation…

- In 1983, the U.S. Department of Education published a booklet titled, "*A Nation at Risk.*"

- *"A Nation at Risk"* claimed that poor academic achievement as measured by standardized tests in science and mathematics showed that American schools lag behind other developed nations.



Standardized Testing as Innovation



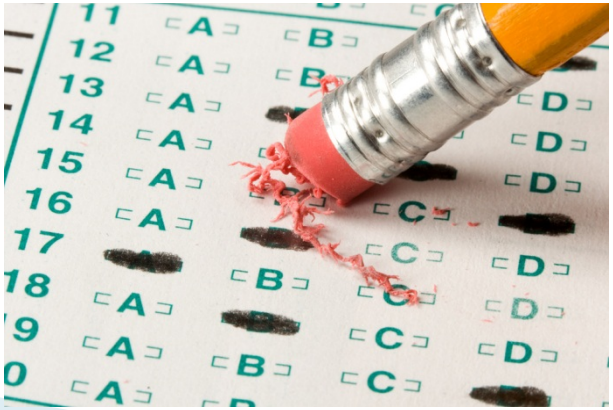
- The problem identified by political leaders was that American schools do not have clear, agreed-on standards for what constitutes rigorous teaching of science and mathematics.

- By 1987 various educational professional organizations, including the National Council of Teachers of Mathematics, had begun to develop subject matter standards in all core subjects.

Standardized Testing as Innovation…

- But the question of how to know whether the implementation of subject matter standards raises achievement remained.

- This led to a demand for tests to measure the success of the standards.

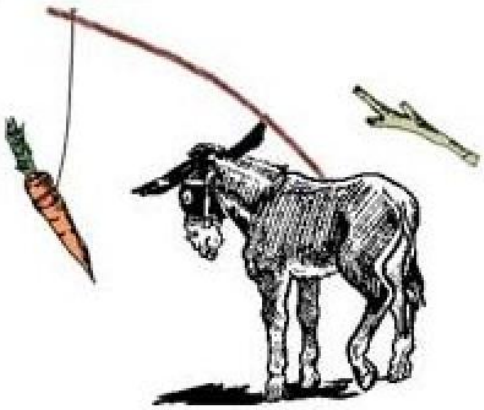


Standardized Testing as Innovation…

- In 2001 President George W. Bush and Congress authorized legislation called the *"No Child Left Behind" (NCLB)* Act.

- This was followed in 2009 by President Barack Obama's "*Race to the Top" (RTTP)* reform program.

Standardized Testing



- In both cases, top-down directives from the federal government, agreed to by state governments, mandated standardized testing of all students as a means of raising achievement.

- To make a donkey pull a cart, there is the carrot (incentive) and the stick (punishment).

Standardized Testing

- The best tangible benefit of this innovation to date is the millions of dollars made by the Educational Testing Service and by Pearson Publishing, which develop and sell the tests.
- Also benefitting from this are the consultants and gurus who tout the tests as an effective means of raising academic achievement.

Standardized Testing

- To date results have not been impressive.

Standardized Testing

- A result among teachers, administrators, and student themselves has been to create a climate in which “teaching for the tests” has developed.

- This has led to the neglect of courses in the arts, music, physical education and other areas of the curriculum deemed less significant than science and mathematics.

Some Innovations that "Work" according to John Hattie's List…

Direct Instruction E.S. = .59

Formative Reflective Assessment E.S. = .90

Teacher-Student Relationship E. S. = .72

Teacher Clarity & Feedback E.S. = .73

Piagetian Programs E.S. = 1.28

Cooperative Learning E.S. = .59

What Works and What Is Worth Doing?

- Effect Size measures academic achievement with regard to certain approaches to teaching and learning.

- Effect Size does not measure the intrinsic worth as perceived by teachers or students of certain methods of teaching and learning.

Postscript…

- *"Out of every ten innovations attempted, all very splendid, nine will end up in silliness."*
- Antonio Machado
- *"We must not cease from exploration…."*
- T. S. Eliot
- *"There is nothing new under the sun…."*
- Ecclesiastes