Evidence-Based Education (EBE)

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Three Stories

• The university president
  – Evidence isn’t relevant
• The vendors
  – What constitutes evidence isn’t clear
• Teaching
  – Evidence isn’t available
What is EBE?

The integration of professional wisdom with the best available empirical evidence in making decisions about how to deliver instruction.
What is professional wisdom?

• The judgment that individuals acquire through experience
• Consensus views
• Increased professional wisdom is reflected in numerous ways, including the effective identification and incorporation of local circumstances into instruction
What is empirical evidence?

- Scientifically-based research from fields such as psychology, sociology, economics, and neuroscience, and especially from research in educational settings
- Empirical data on performance used to compare, evaluate, and monitor progress
Evidence-based Education

- Evidence based Education
  - Professional Wisdom
    - Individual Experience
  - Consensus
  - Scientifically-Based Research
  - Empirical Evidence
    - Empirical Information
Why are both needed?

• Without professional wisdom education cannot
  – adapt to local circumstances
  – operate intelligently in the many areas in which research evidence is absent or incomplete.

• Without empirical evidence education cannot
  – resolve competing approaches
  – generate cumulative knowledge
  – avoid fad, fancy, and personal bias
Medicine and Ag as Models

- A little history
- Evidence-based medicine
- Examples
  - The Illinois Library
  - The FTC and diet pills
  - The Hormone Replacement Therapy Study
The HRT Study

• Sample: 27,000+ Women, aged 50-79.
• Research Design: Women randomly assigned to receive either hormone therapy or a placebo; Data collected for 8-12 years.
• Hypothesis: HRT will reduce heart disease and fractures without increasing breast cancer
The HRT Study

Disease rates for women on estrogen plus progestin or placebo

- **Risks**
  - Heart Attacks
  - Strokes
  - Breast Cancer
  - Blood Clots

- **Benefits**
  - Colorectal Cancer
  - Hip Fractures
  - Endometrial Cancer

- **Neutral**
  - Deaths

Legend:
- Blue: Estrogen + progestin
- Yellow: Placebo

Number of cases per year in 10,000 women
Social Policy and ED examples

• Nurse-home visitation
• DARE
• High quality preschool
• National Reading Panel report
Policy Requirements

- Difference in the mix of professional judgment, scientific research, and objective measures that justifies imposition of requirements contrasted with identification as good practice
- Reading research vs. math research as example
Scientifically Based Research

“...means research that involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs”

(No Child Left Behind Act of 2001)
Scientifically Based Research

• **Quality**
  – To what degree does the design and analysis and logical inference support the claims and conclusions?

• **Relevance**
  – To what degree are the variables and circumstances similar across the research and the settings in which the research is to be applied?
Quality: Levels of evidence

All evidence is NOT created equal

1. Randomized trial (true experiment)
2. Comparison groups (quasi-experiment)
3. Pre-Post comparison
4. Correlational studies
5. Case studies
6. Anecdotes
Randomized Trials: The gold standard

- Claim about the effects of an educational intervention on outcomes
- Two or more conditions that differ in levels of exposure to the educational intervention
- Random assignment to conditions
- Tests for differences in outcomes
Why is randomization critical?

- Assures that the participants being compared have the same characteristics across the conditions.
- Rules of chance mean that the smart, motivated, experienced, etc. have the same probability of being in condition 1 as in condition 2.
- Without randomization, differences between two conditions may result from pre-existing differences in the participants and subtle selection biases.
Why is randomization critical?

Without randomization, simple associations such as between internet use and science grades have many different interpretations.

Average science scores by students' reports on use of the Internet at home.
Relevance

- Does the study involve a similar intervention and outcome to those of interest?
- Were the participants and settings representative of those of interest?
Evidence will not make the decision

• Be skeptical
• Consider other ways of achieving goal
• Consider consequences and local circumstances
• Consult with experts who understand evidence before making costly decisions (This is different from consulting authorities who may know the subject area but not rules of evidence)
EBE -- Where are we?

eexternal
evidence

professional
wisdom
Education Lags Behind (Figure 1)

While the total number of articles about randomized field trials in other areas of social-science research has steadily grown, the number in education research has trailed behind.

* Articles about definite and possible randomized field trials.

**SOURCE:** Robert Boruch, Dorothy de Moya, and Brooke Snyder, 2001
What ED will do

• The What Works Clearinghouse (w-w-c.org)
  – interventions linked to evidentiary support
  – systematic reviews
  – standards for providers of evaluations, and list of evaluators who have agreed to follow those standards
What ED will do

• The National Center for Education Evaluation
  – Well designed, timely, & nonpartisan evaluations of ED’s own programs
    • Funding streams
    • Specific interventions
  – Funding for development and evaluation of interventions in the field
  – Feedback into discretionary grant programs
What ED will do

• Internal review of ED’s own products
• Build capacity in the field
  – Professional training
  – Workshops for major decision makers
• Systematic and long-term research programs to fill gaps
Goals

• ED will provide the tools, information, research, and training to support the development of evidence-based education
• The practice of evidence-based education will become routine
• Education across the nation will be continuously improved
• Wide variation in performance across schools and classrooms will be eliminated