



Trust in Numbers

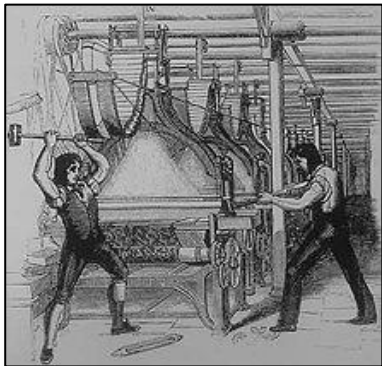
Academic Affairs in the Age of Big Data

University Leadership Council

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Rage Against the Machine

Education vs. Calculation



“It is the Age of Machinery, in every outward and inward sense of that word; the age which, with its whole undivided might, forwards, teaches and practises the great art of adapting means to ends. Nothing is now done directly, or by hand; all is by rule and calculated contrivance...

On every hand, the living artisan is driven from his workshop, to make room for a speedier, inanimate one. The shuttle drops from the fingers of the weaver, and falls into iron fingers that ply it faster...

Instruction, that mysterious communing of Wisdom with Ignorance, is no longer an indefinable tentative process, requiring a study of individual aptitudes, and a perpetual variation of means and methods, to attain the same end; but a secure, universal, straightforward business, to be conducted in the gross, by proper mechanism, with such intellect as comes to hand.”

Thomas Carlyle, “Signs of the Time” (1829)

The Era of Big Data

Is Education Just Another “Information Industry”?

In Business



In Education



Pedagogy

Adaptive learning



Advising

Predictive analytics



Program Review

External Benchmarking

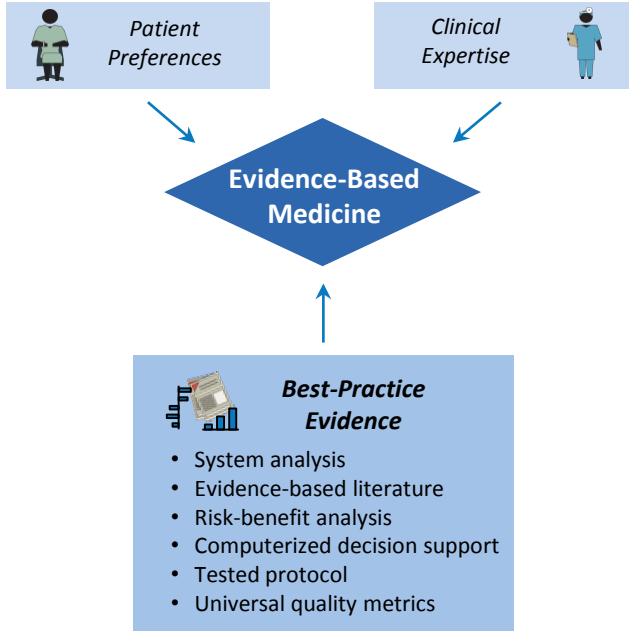


Enrollment Management

Pricing models

Bringing Data to Health Care

Rise of Evidence-Based Medicine Sparks Controversy Among Physicians



Doctors Dispute Value of Big Data



“Evidence-based practice gives us a cookbook. No progress was ever made by following a cookbook.”

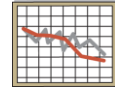
“Metrics from a generic trial don’t usually apply to individuals in your office.”

“EBM comes from committees, not doctors.”

“Intuition-based medicine, like art, is always about a century ahead of science.”

But EBM Improves Patient Outcomes

Michigan Saves Lives and Millions After Implementing Best Practice



Research Identifies Problem

Half of intensive-care patients receive central venous catheter and each year:

- 80,000 infected
- 28,000 die
- Cost of \$2.3 billion

Data Reveals Best-Practice

Five-item checklist assures proper precautions are taken to prevent infection from catheter

Practice Implementation

Doctors required to follow checklist at 108 intensive care units in Michigan

Early Outcomes

- Infection rate drops from 4% to almost 0% in intensive care units
- 1,500 lives saved
- \$200 million saved

The Need for Data

The Problem of Scale

There is too much information even for an expert to process

- *Physicians trying to keep up with recent research*
- *Advisors trying to support hundreds of students*
- *An instructor teaching a course with 200 students*
- *Provosts reviewing programs across dozens of disciplines*

The Problem of Cost

Experts are too expensive for everyone to have access

- *MDs seeing patients for routine care*
- *Tenured faculty teaching small classes*
- *Faculty advising undergraduates*
- *Professional advisors meeting personally with all students every term*

The Problem of Trust

Only an expert can evaluate the work of another expert

- *Accountable health care*
- *Performance-based funding for higher education*
- *Faculty's lack of trust in administration*
- *Administration's lack of trust in faculty*

Four Ways to Use Data

- 1 Automation** Remove the need for human judgment in repetitive tasks
- 2 Assessment** Compare performance to clearly defined goals
- 3 Analysis** Find the correlation or causation behind an observed trend
- 4 Validation** Justify a decision on the basis of mechanical objectivity

Uncovering Truths or Providing Cover For Decisions?

Does This Sound Familiar?

“The appeal of numbers is especially compelling to bureaucratic officials who lack the mandate of a popular election, or divine right. Arbitrariness and bias are the most usual grounds upon which such officials are criticized. A decision made by the numbers (or by explicit rules of some other sort) has at least the appearance of being fair and impersonal. Scientific objectivity thus provides an answer to a moral demand for impartiality and fairness. Quantification is a way of making decisions without seeming to decide. Objectivity lends authority to officials who have very little of their own.”

Theodore Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton: Princeton University Press, 1995)

Notes:



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