

Essential Skills in Computer-Enhanced Learning Scholarship, Research, and the Questions We Should Be Asking

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A framework for research in educational technology (ET)

Descriptive Comparative Qualitative

No intervention



Media-comparative



CAI-CAI



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Cook, Acad Med 2005
Cook, Med Teach 2009

“Studies comparing computer with
more conventional instruction or
media should be discouraged.”

– Richard Clark - 1985

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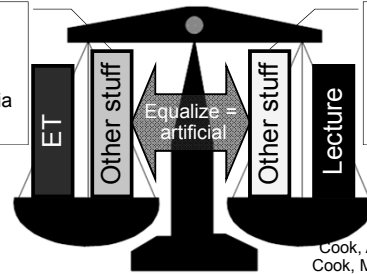
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What's wrong with media-
comparative research?

CONFOUNDING

-Instr.
methods
-Content
-Time
-Multimedia
-Adapt



-Instr.
methods
-Content
-Time
-Instructor
-Adapt

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Cook, Acad Med 2005
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What to do? Comparative ET research

- Within-media comparisons
 - WBL-WBL
 - VP-VP
 - Simulator-simulator
- Controllable (minimize confounding)
- Help us know how to use, improve the new technology (*clarify* [Cook 2008])
- Advance the science (theory → predict)

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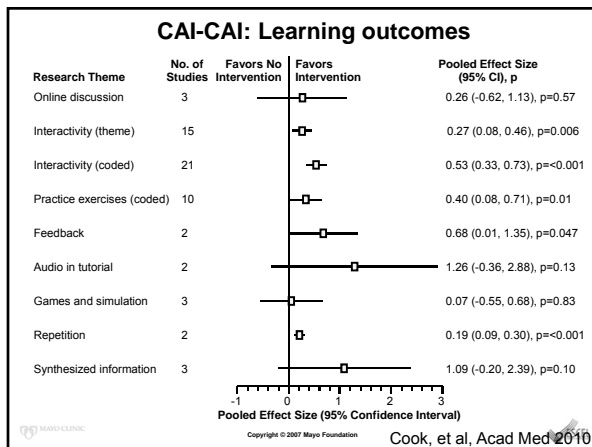
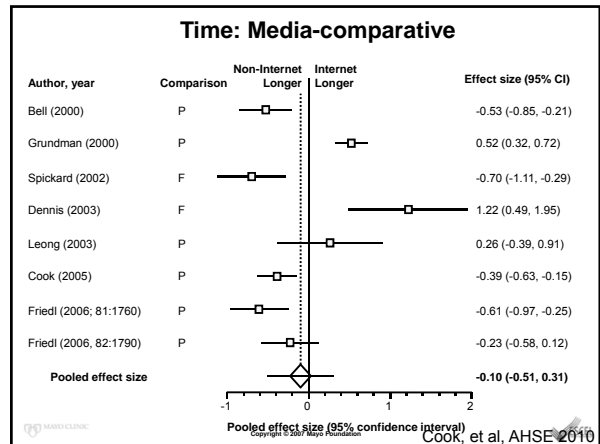
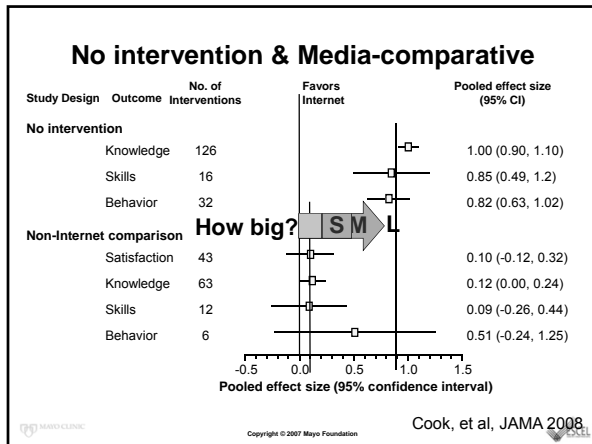
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What is the evidence?

A summary of systematic reviews

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- ### Summary
- Comparisons with no intervention
 - → **LARGE gains**
 - Media-comparative studies
 - → On average **NO DIFFERENCE**
 - CAI-CAI: Improved outcomes with
 - Interactivity
 - Practice exercises
 - Repetition
 - Feedback

- ### Repeat for ...
- Virtual patients
 - Animations
 - Technology-enhanced simulation
- If you teach them, they will learn**

It doesn't matter what modality

Evidence doesn't tell us how to teach

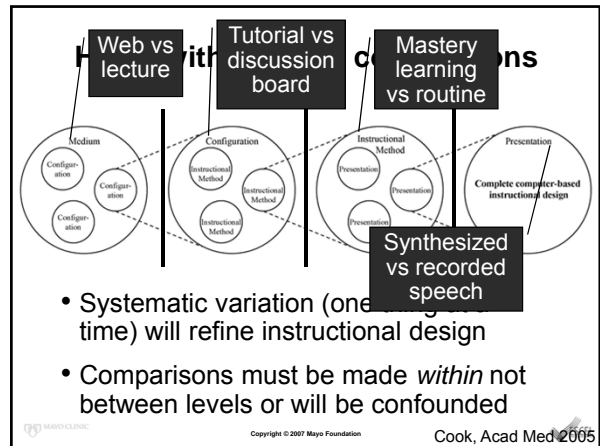
How does this apply to you?

Research Paradigms

- Experiment
 - Example: RCT
 - Reductionist; **how**
- Quality improvement
 - Example: Build-Measure-Learn
 - Practical; **implementation**
- Qualitative
 - Example: grounded theory
 - **Why, when**

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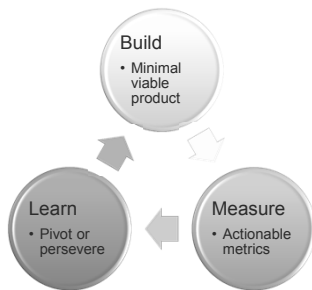


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Implementation



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When, Why

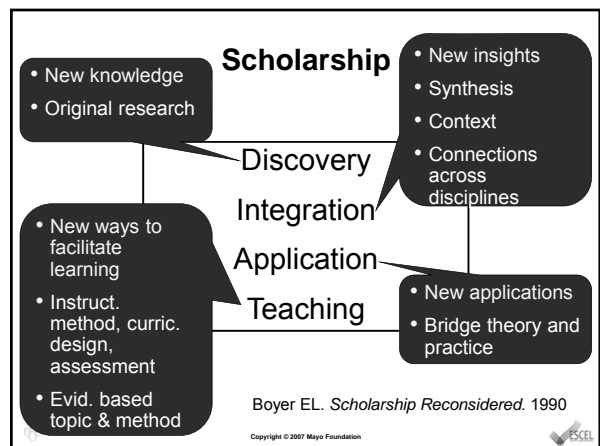


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Scholarship: quality & questions



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Standards for Assessing the Quality of Scholarship

- Clear goals
 - Do your homework!
- Adequate preparation
 - Existing scholarship (research, theories)
 - Skills, mentorship, resources
- Appropriate methods
- Outstanding results
 - Substantial contribution to field (\neq "p<.05")
 - Often involves peer review
- Effective communication
 - Clear, organized, complete
- Reflective critique
 - Limitations, strengths
 - Integration
 - Improvements, next steps

Mayo Clinic Glassick CE. *Scholarship Assessed*. 1997. Copyright © 2007 Mayo Foundation.

Important Questions in Technology-Enhanced Medical Education

"It is more important to understand the question than to find the answer." – Morrison

"The single most important component of a study is the research question" – Bordage and Dawson

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Important Questions in Technology-Enhanced Medical Education

- What is it? – Description
- Does it work? – Justification
- How or why does it work?
- When does it work?
- How can it be improved?

Clarification

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"What's next?"

(Kevin Eva, 2008)

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Scholarship: Questions & Quality

Not study designs

What are the *questions* regarding Educational Technologies you see being asked and answered during sessions?

What is the *quality* of scholarship?

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Scholarship in Medical Education Technology

		Description	Justification	Clarification
Scholarship*	Low			
	High			

* Clear goals, adequate preparation, appropriate methods, outstanding results, effective communication, reflective critique

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