WHAT IS THIS THING CALLED *RIME*?

Geoff Norman

McMaster University

Early History

- SUNY Buffalo 1950s
  - George Miller, Jason, McGuire, Abrahamson
- Jason → Michigan State U
  - Shulman, Elstein, Downing, Bridgeham
- Abrahamson → U Southern California
  - Barrows, Nyquist
- McGuire, Miller → U Illinois Chicago
  - Gordon Page, Bordage, Downing

The 1970's and PBL

- Problem Based Learning begins at McMaster, 1965
  - PED (now PERD) opens 1971
    - Neufeld, Barrows, --- Norman, Woodward,
- Maastricht adopts PBL 1973
  - Large education group – Schmidt, van der Vleuten
- Other schools (U New Mexico; Linkoping)

The Testing Agencies

- Testing Boards and Evaluation methodologies
- American Board Internal Medicine
  - Webster, Swanson, Norcini
- National Board of Medical Examiners
  - Swanson, Case, LaDuca,
- Medical Council of Canada
  - Bordage, Page, Reznick, Wood, Blackmore

The Three Waves

(Norman GR. Fifty years of medical education research. Med Educ 2011; 45: 785-91)

Wave 1: The misfits (1960—1980)

Folks with unrelated PhDs who muddled through

(Norman, McGuire, Irby, Page, etc).

Wave 2: The specialists (1970 – now)

Folks with PhDs in relevant area (psychology, sociology, psychometrics

(Norcini, Eva, Regehr, van der Vleuten)

Wave 3: The med educ specialists

Folks, usually health professionals, with graduate degree in med educ.

RESEARCH TRADITIONS

- QUANTITATIVE
  - Experimental
  - Psychometric
  - Epidemiological
  - Correlational
- QUALITATIVE
  - (no comment)
- REVIEW
  - Systematic
  - Critical

THE EXPERIMENTAL TRADITION

- Randomize to 2 or more groups
- Intervention under experimental control
- Frequently theory-testing

medical education
www.mededuc.com

clinical reasoning

The value of basic science in clinical diagnosis: creating coherence among signs and symptoms

Nicole N Woods, Lee R Brooks & Geoffrey R Norman

BACKGROUND We investigated whether learning basic science mechanisms may have mnemonic value in helping students remember signs and symptoms, in comparison with learning the relation between symptoms and diagnoses directly.

PURPOSE To compare 2 approaches to learning diagnosis: learning how features of various conditions relate to underlying pathophysiological mechanisms

Medical Education 2005; 39: 107–112
doi:10.1111/j.1365-2929.2004.02036.x

INTRODUCTION

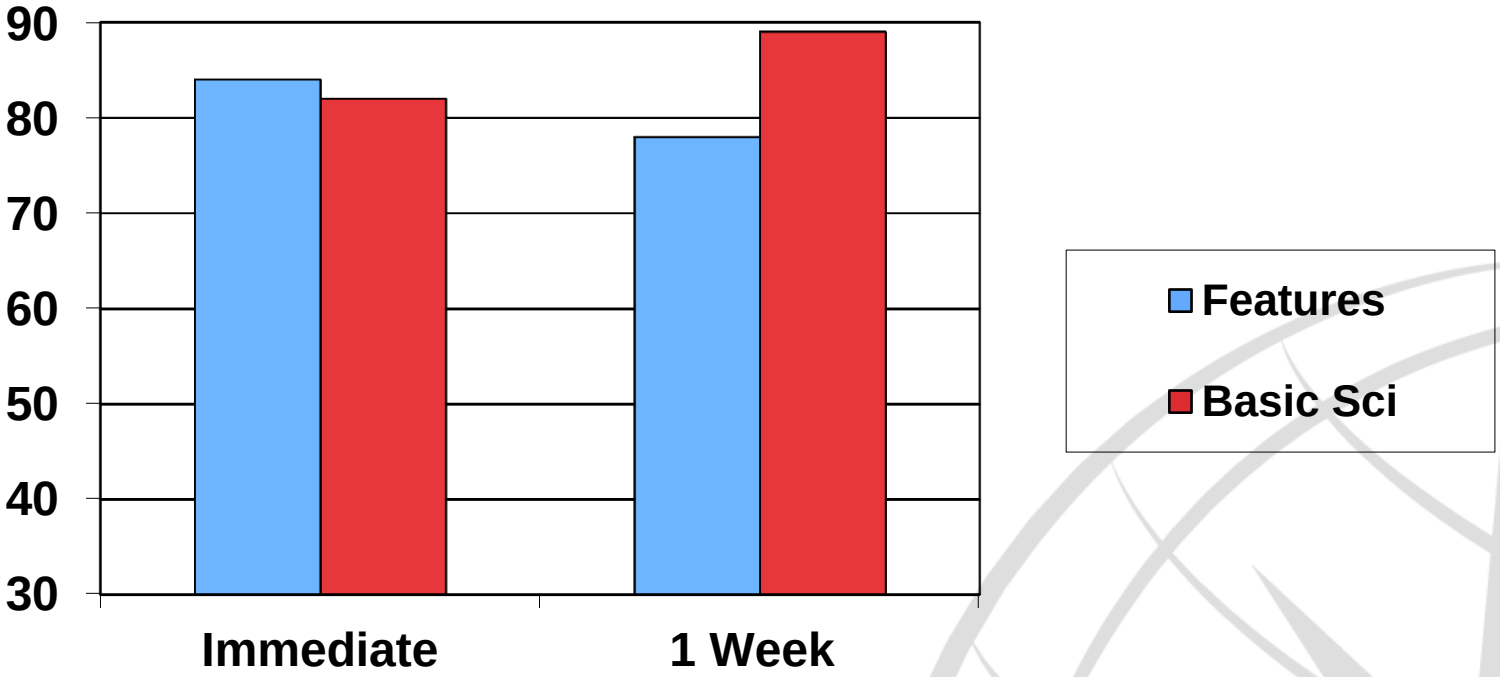
Medical students spend a minimum of 2 years studying basic science. Paradoxically, although educators may believe that this is a necessary foundation for clinical medicine, studies of clinician reasoning have

Woods, Brooks, Norman, 2003

- Goal:
  - Role of basic science in enhancing coherence of symptoms and diseases
- Methods
  - Four neurological diseases
    - Muscle Disorders
    - Neuromuscular Junction Disorders
    - Upper Motor Neuron Lesions
    - Lower Motor Neuron Lesion
  - 18 features / category
  - 36 undergrad psych students

- Basic Science or Sympt x Disease probability

Score on Dx Test



Anatomical Sciences Education

RESEARCH REPORT

ASE

The Relative Effectiveness of Computer-Based and Traditional Resources for Education in Anatomy

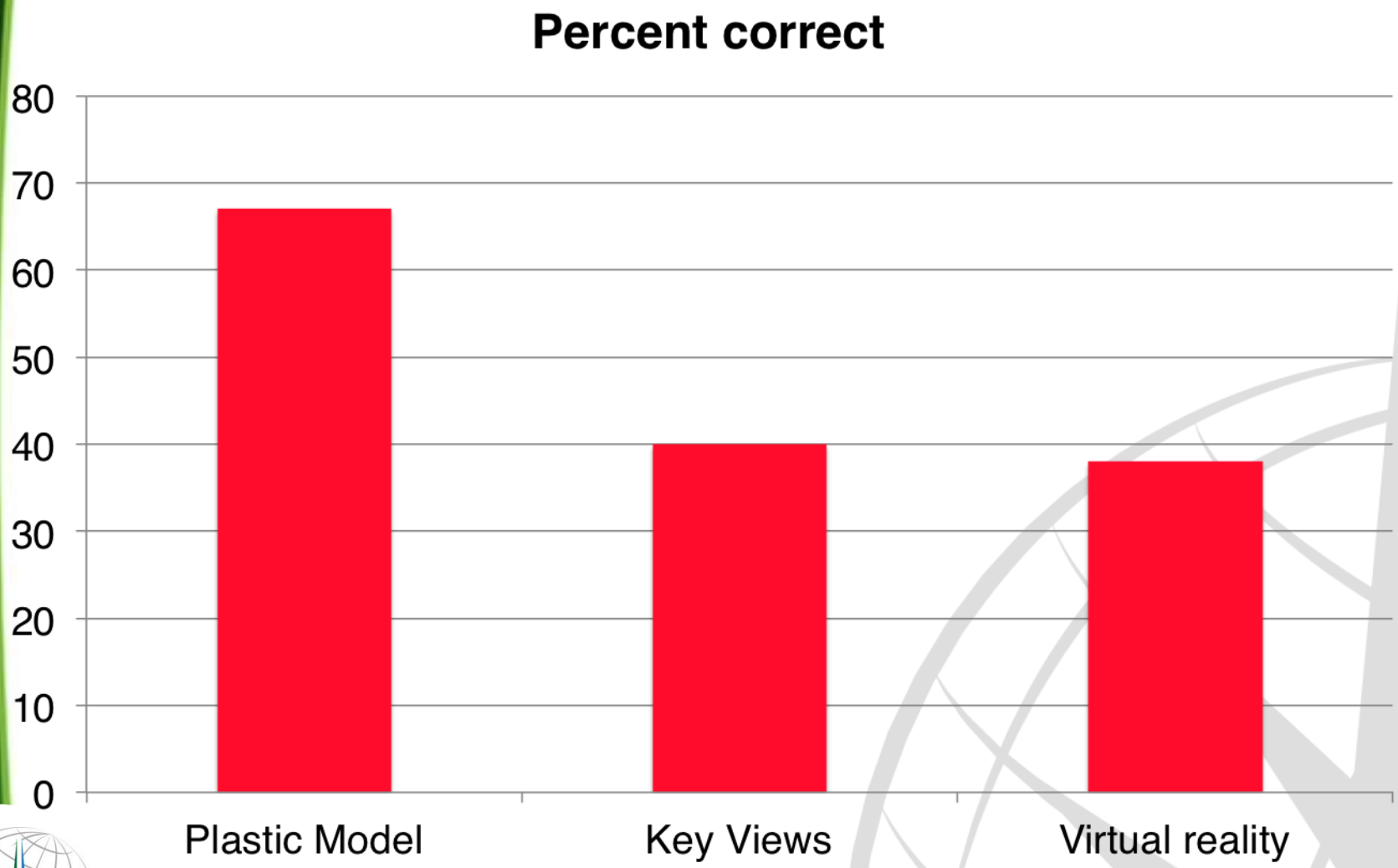
Zaid Khot,[1] Kaitlyn Quinlan,[2] Geoffrey R. Norman,[3*] Bruce Wainman[4]

[1]Schulich School of Medicine and Dentistry, the University of Western Ontario, London, Ontario, Canada
[2]School of Physical Therapy, the University of Western Ontario, London, Ontario, Canada
[3]Department of Clinical Epidemiology and Biostatistics, Faculty of Health Sciences, McMaster University, Hamilton, Ontario, Canada
[4]Department of Pathology and Molecular Medicine, Faculty of Health Sciences, McMaster University, Hamilton, Ontario, Canada

There is increasing use of computer–based resources to teach anatomy, although no study has compared computer-based learning to traditional. In this study, we examine the effec-

Khot, Wainman, Norman 2103

- "Real" Virtual Reality vs. Two view vs.Real Reality (plastic pelvis)
  - 3 groups n = 20 undergrad
  - 20 nominal questions
  - Test on real skeletal pelvis


Percent correct
80
70
60
50
40
30
20
10
0
Plastic Model
Key Views
Virtual reality

THE PSYCHOMETRIC TRADITION

- Devise assessment instrument
- Reliability
  - Administer on multiple observations (rater, time, version etc.
- Validity
  - Correlate with external variable (other measure, demographic, personal characteristics

Academic Medicine:
October 2004 - Volume 79 - Issue 10 - pp S40-S42
Papers: Correlates of Clinical Performance

The Ability of the Multiple Mini-Interview to Predict Preclerkship Performance in Medical School

Eva, Kevin W.; Reiter, Harold I.; Rosenfeld, Jack; Norman, Geoffrey R.

Section Editor(s): Perkowski, Linda PhD

Abstract

Problem Statement and Background. One of the greatest challenges continuing to face medical educators is the development of an admissions protocol that provides valid information pertaining to the noncognitive qualities candidates possess. An innovative protocol, the Multiple Mini-Interview, has recently been shown to be feasible, acceptable, and reliable. This article presents a first assessment of the technique's validity.

Method. Forty five candidates to the Undergraduate MD program at McMaster University participated in an MMI in Spring 2002 and enrolled in the program the following autumn. Performance on this tool and on the traditional protocol was compared to performance on preclerkship evaluation exercises.

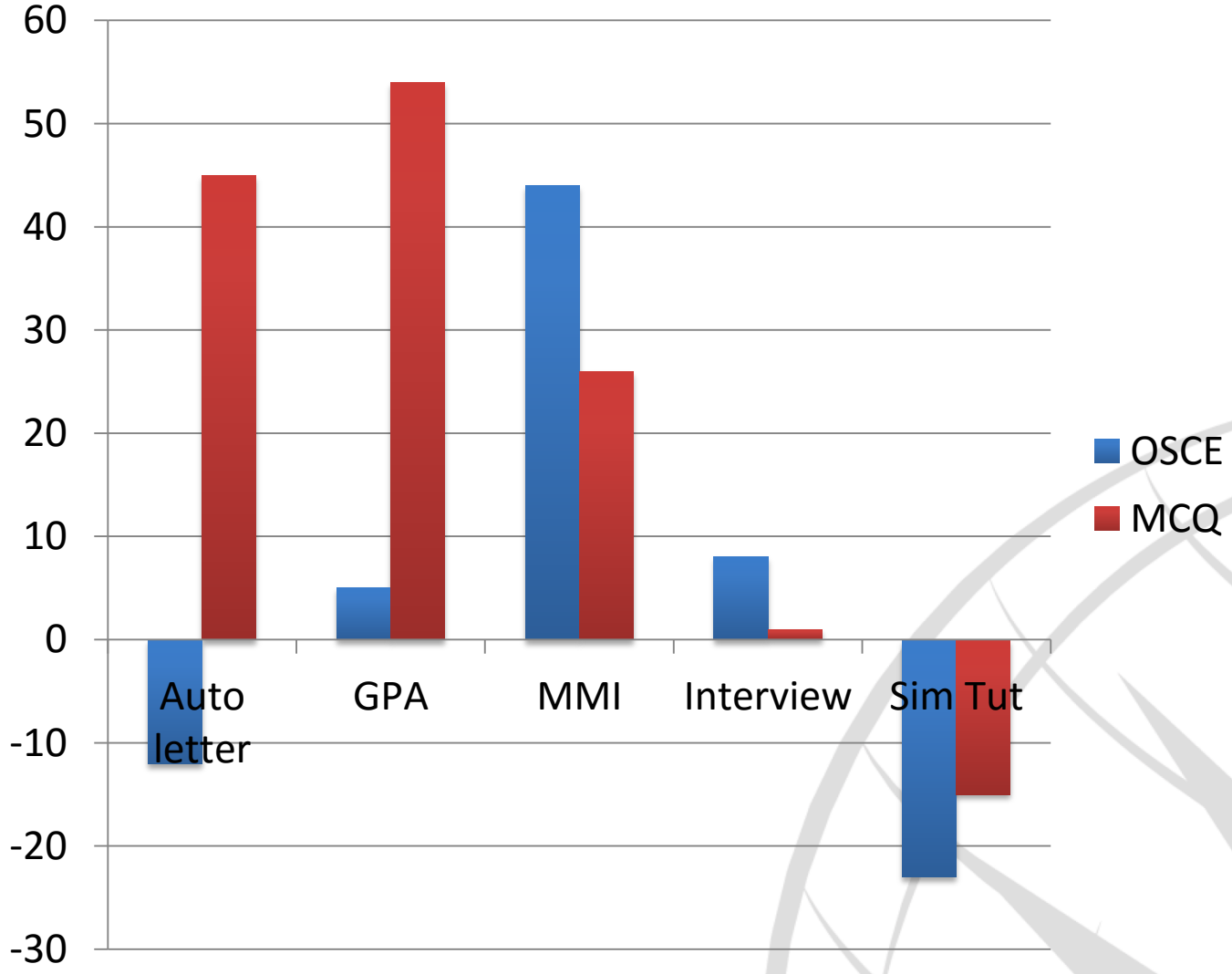
Results. The MMI was the best predictor of objective structured clinical examination performance and grade point average was the most consistent predictor of performance on multiple-choice question examinations of medical knowledge.

Conclusions. While further validity testing is required, the MMI appears better able to predict preclerkship performance relative to traditional tools designed to assess the noncognitive qualities of applicants.

The Ability of the MMI to Predict Preclerkship Performance

- 45 students
- Measures of:
  - ADMISSIONS
    - Auto Letter
    - GPA
    - MMI
    - Interview
    - Sim Tutorial
  - IN COURSE
    - Multiple Choice Exam
    - OSCE

Correlation with Criterion



THE EPIDEMIOLOGIC TRADITION

- Typically designed to examine “risk factors” for future behaviour
  - E.g. Admissions variables
  - In-course assessments
  - Certification examinations
  - Performance in practice

JAMA The Journal of the American Medical Association

September 5, 2007, Vol 298, No. 9 >

< Previous Article Next Article >

Original Contribution | September 5, 2007

CLINICIAN'S CORNER

Physician Scores on a National Clinical Skills Examination as Predictors of Complaints to Medical Regulatory Authorities FREE

Robyn Tamblyn, PhD; Michal Abrahamowicz, PhD; Dale Dauphinee, MD; Elizabeth Wenghofer, PhD; André Jacques, MD; Daniel Klass, MD; Sydney Smee, MSc; David Blackmore, PhD; Nancy Winslade, PharmD; Nadyne Girard, MSc; Roxane Du Berger, MSc; Ilona Bartman, MA; David L. Buckeridge, MD, PhD; James A. Hanley, PhD

[+] Author Affiliations

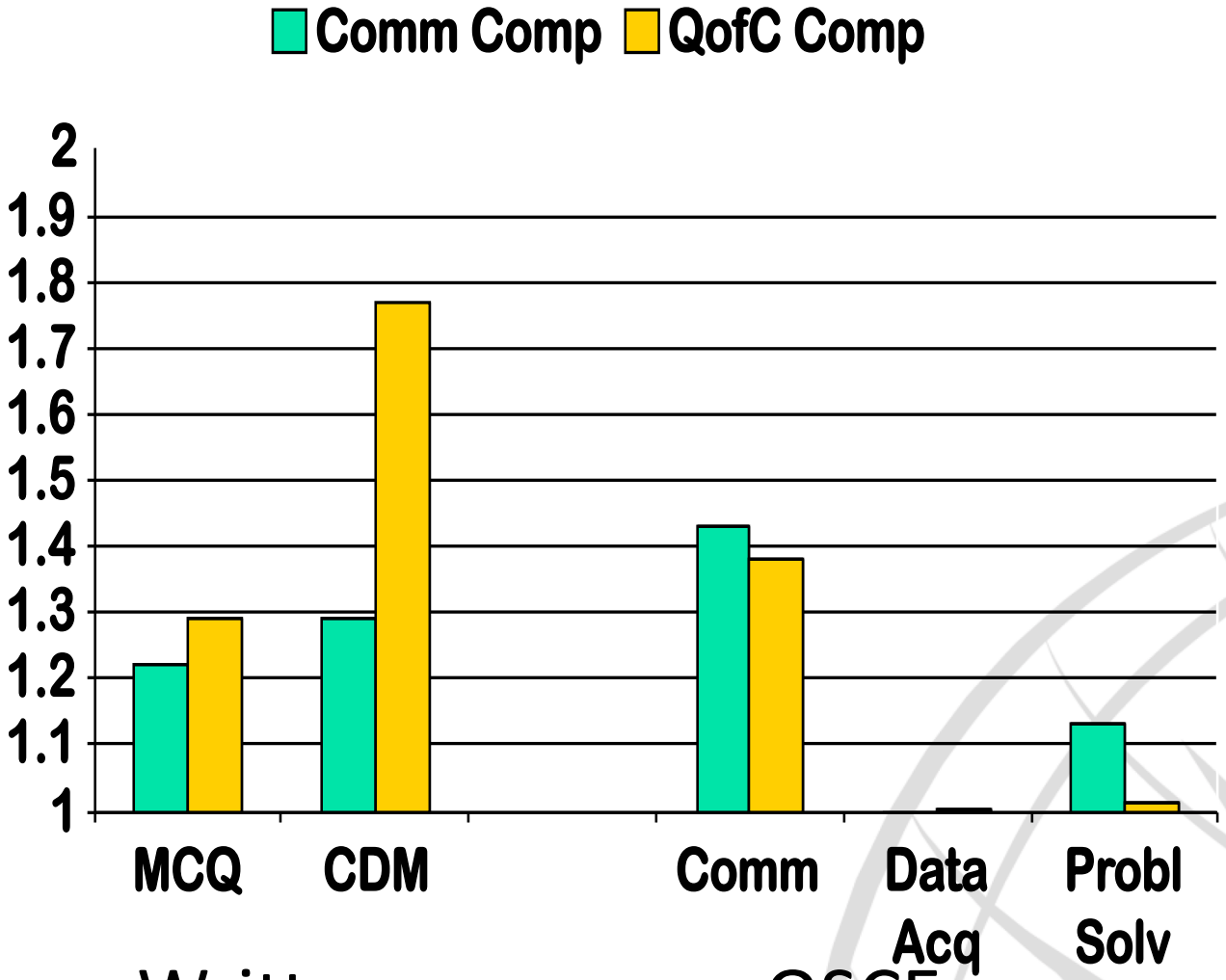
JAMA. 2007;298(9):993-1001. doi:10.1001/jama.298.9.993.

Tamblyn et al. (2007)
Licensing Exam Score Board and Complaints to Regulatory

- 3424 MDs, licensing exam 1993-1996

- practice in Ontario & Quebec

- Complaint to reg body (n = 696)


Comm Comp
QofC Comp
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
MCQ
CDM
Comm
Data Acq
Probl Solv
Written
OSCE

THE CORRELATIONAL TRADITION

Adv in Health Sci Educ (2015) 20:5–21
DOI 10.1007/s10459-014-9503-y

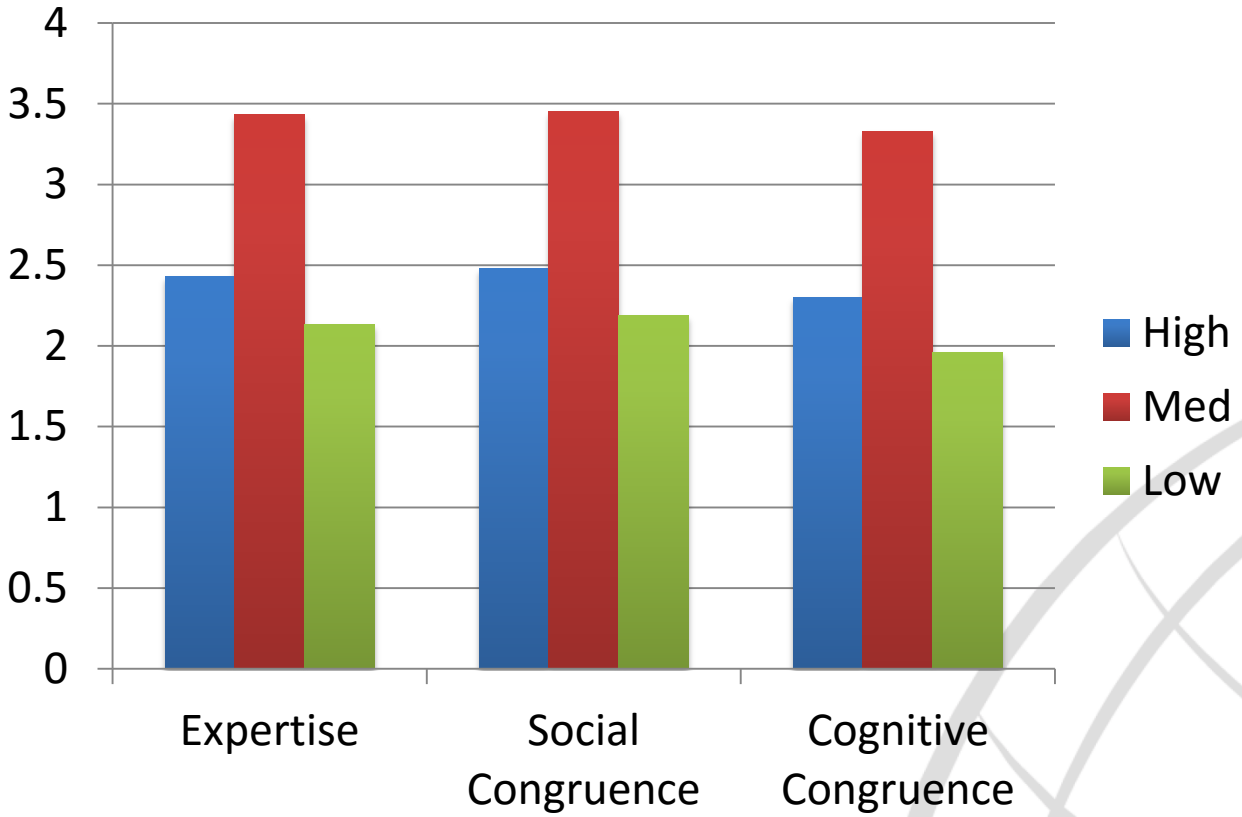
To what extent do tutor-related behaviours influence student learning in PBL?

Esther Chng · Elaine H. J. Yew · Henk G. Schmidt

Received: 29 July 2013 / Accepted: 19 March 2014 / Published online: 17 April 2014

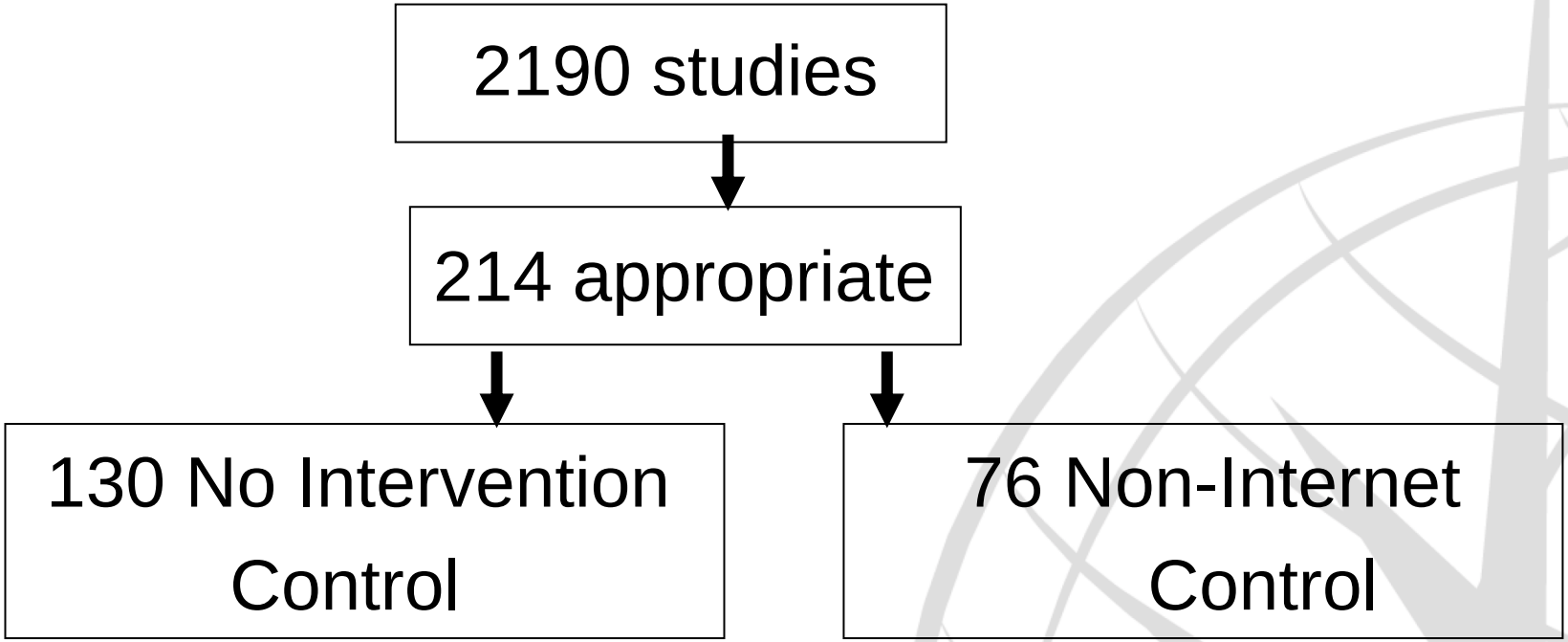
Abstract The purpose of this study was to investigate how tutor behaviours influence learning in problem-based learning (PBL). A previous study had indicated a significant influence of the tutor's social congruent behaviour on the PBL process and this study

Importance of tutor characteristic by student achievement

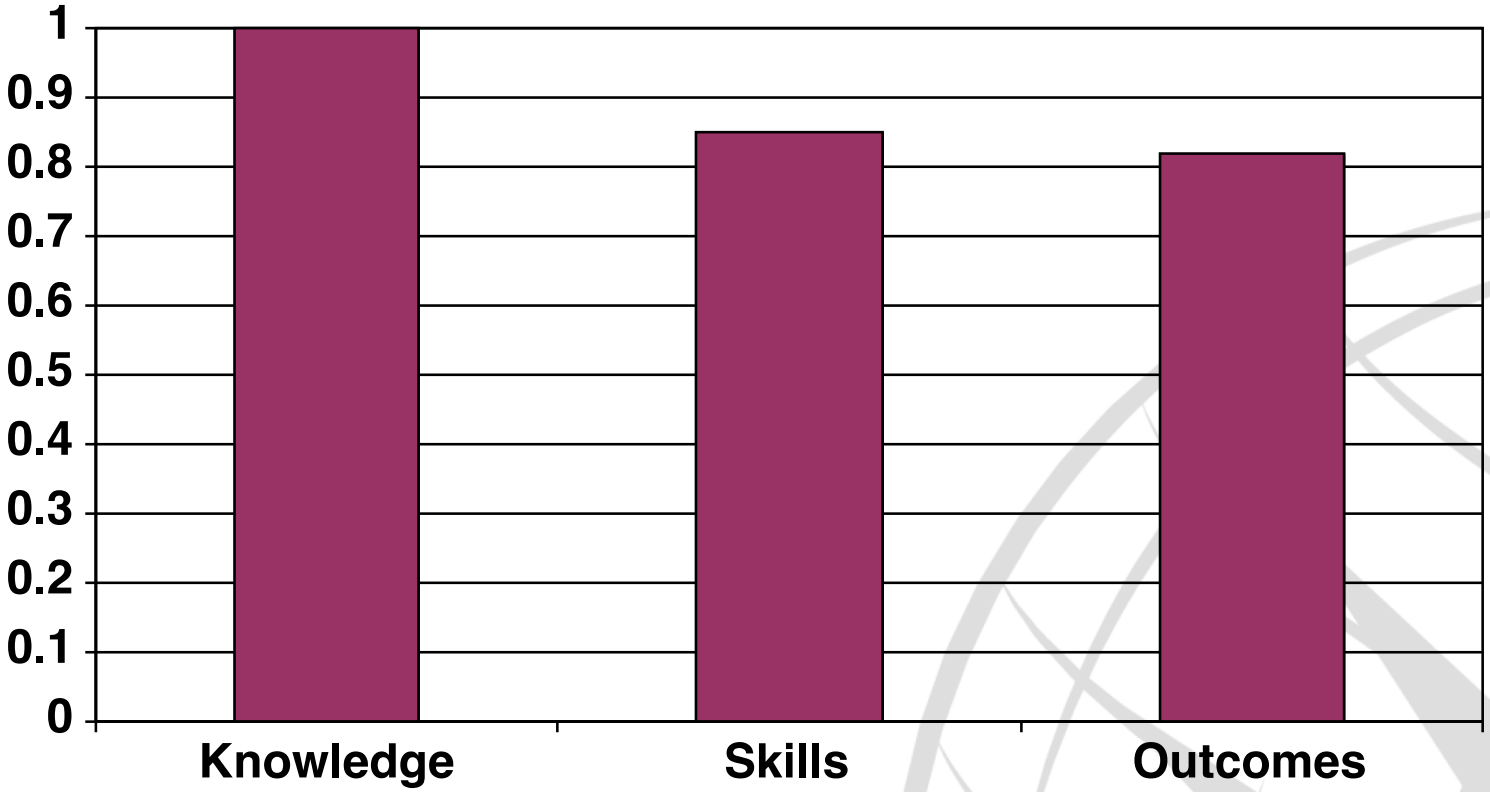


Effect of Learning Technology (Internet Learning) in Health Sciences

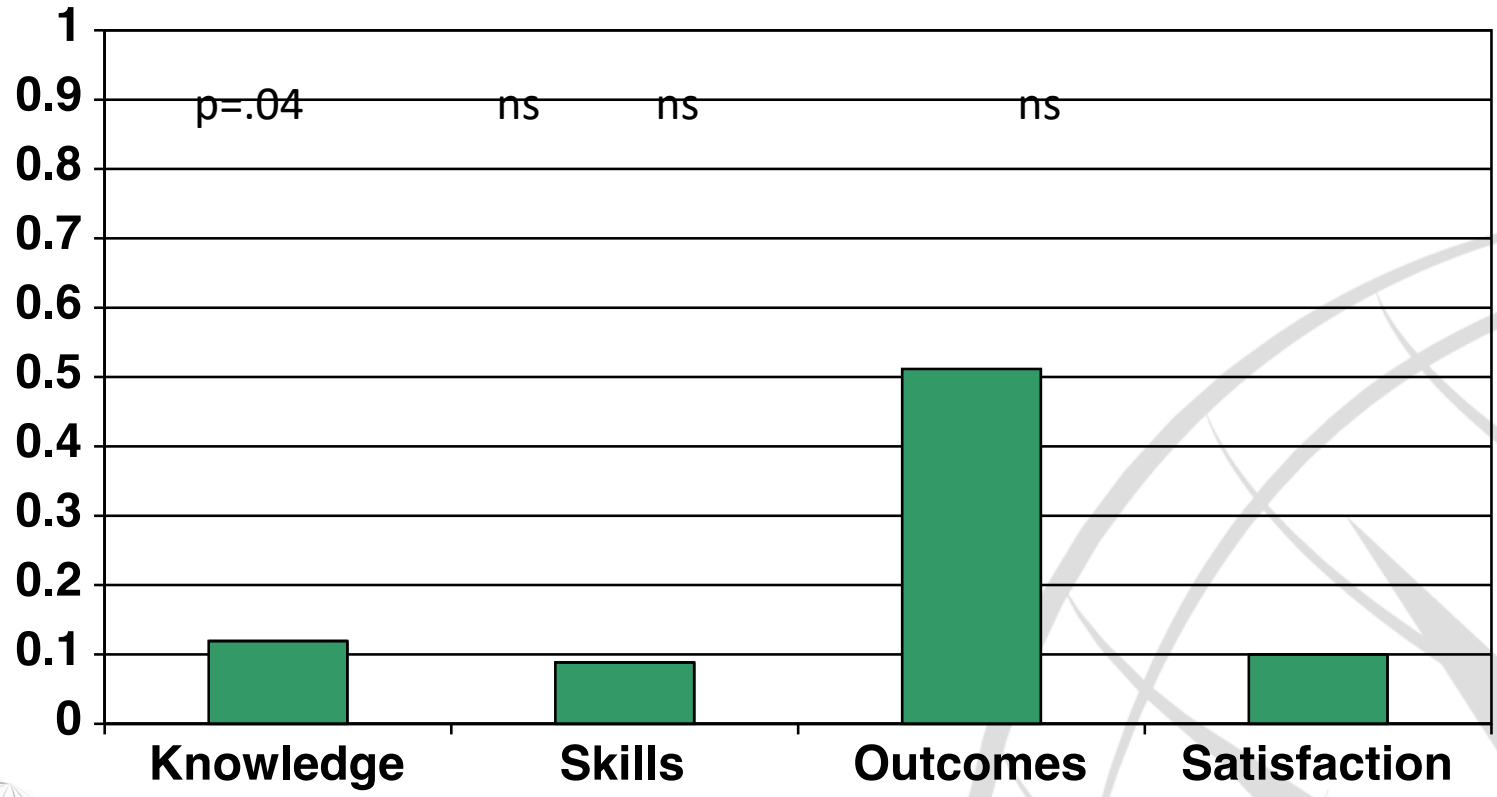
(Cook et al, JAMA 2008; 300: 1181-1196)



No Intervention



Alternative Intervention



CRITICAL REVIEW
ALBANESE

MOST CITED ARTICLES

The themes, institutions, and people of medical education research

Table 4 The ten most cited articles in the field of medical education 1988–2010

Rank	Article	Times cited
1	Albanese, M. A., & Mitchell, S. (1993). Problem-based learning—A review of literature on its outcomes and implementation issues. *Academic Medicine, 68*(1), 52–81	706
2	Norman, G. R., & Schmidt, H. G. (1992). The psychological basis of problem-based learning—A review of the evidence. *Academic Medicine, 67*(9), 557–565	422
3	Schmidt, H. G., Norman, G. R., & Boshuizen, H. P. A. (1990). A cognitive perspective on medical expertise—Theory and implications. *Academic Medicine, 65*(10), 611–621	415
4	Vernon, D. T. A., & Blake, R. L. (1993). Does problem-based learning work—A meta-analysis of evaluative research. *Academic Medicine, 68*(7), 550–563	391
5	Hafferty, F. W., & Franks, R. (1994). The hidden curriculum, ethics teaching, and the structure of medical education. *Academic Medicine, 69*(11), 861–871	333
6	Irby, D. M. (1995). Teaching and learning in ambulatory care settings—A thematic review of the literature. *Academic Medicine, 70*(10), 898–931	315
7	Colliver, J. A. (2000). Effectiveness of problem-based learning curricula: Research and theory. *Academic Medicine, 75*(3), 259–266	260
8	Anderson, M. B., Cohen, J. J., Hallock, J. A., Kassebaum, D. G., Turnbull, J., Whitcomb, M. E., et al. (1999). Learning objectives for medical student education—Guidelines for medical schools: Report I of the Medical School Objectives Project. *Academic Medicine, 74*(1), 13–18	258
9	Barrows, H. S. (1993). An overview of the uses of standardized patients for teaching and evaluating clinical skills. *Academic Medicine, 68*(6), 443–451	252
10	Hafferty, F. W. (1998). Beyond curriculum reform: Confronting medicine's hidden curriculum. *Academic Medicine, 73*(4), 403–407	245

Broader Issues

- What kind of research is most popular?
- What kind of research is most valued?

Rank	Categories	Overall count
1	Issues in student assessment	1559
2	Clinical skills training	1303
3	Clinical clerkships	1218
4	Problem-based learning	731
5	Community-based training	594
6	Clinical competence assessment	529
7	Teaching the clinical sciences	483
8	Communication skills training	368
9	Student characteristics	366
10	Objective structured clinical examination	347
11	Teaching the basic sciences	299
12	Nature of clinical reasoning	248
13	Professionalism in medicine	236
14	Costs of medical education	236
15	Faculty development	189
16	Use of simulations	160
17	Admission to medical school	107
18	Medical licensing examination	88
19	Knowledge retention	84
20	Specialty choice	68

The Cook – Schmidt Framework

- DESCRIPTION (What is it?)
  - Simple description of innovation (curriculum, assessment, technology),with maybe satisfaction measure
- JUSTIFICATION (Does it work?)
  - Demonstration that the innovation is as or more effective than a comparator
- CLARIFICATION (Why does it work?)
  - Experimental manipulation of causal factors

Research Journals

Medical Education	ASME(UK)	12/yr
Academic Medicine	AAMC(US)	12/yr
Adv. Health Science Educ		5/year
Medical Teacher	AMEE	12/yr
Teach Learn Med	US	4/yr

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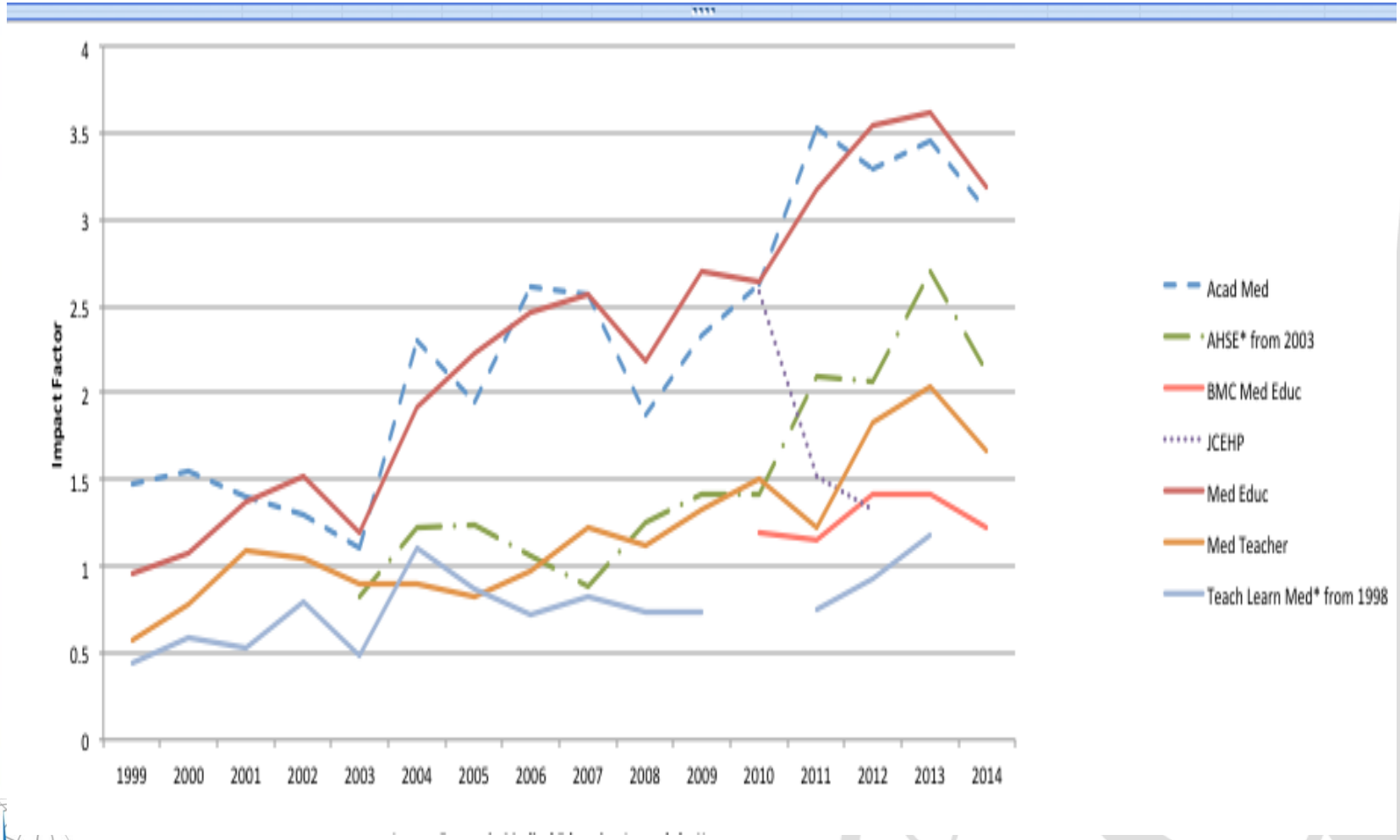
Anatomical Science Education

Medical Science Educator

Journal of Postgraduate Education

Impact Factor/Year



Achievements from 30 Years of Medical Education Research

- *Survey of AHSE editors (n = 15)*

1) Assessment	11
2) Clinical Reasoning	8
3) Content specificity	5
4) Simulation	4
5) Science of Teaching and Learning	4
Progress as a Discipline	4

Assessment and the Licensing Bodies (11)

- U.S. and Canada licensing bodies
  - NBME, ABIM, Medical Council Canada

Major role in advancing “state of the art” in assessment

- New assessment methods (OSCE, Q4)
- International recognition (Hubbard)
- Grant programs (MCC, Stemmler)
- FAIMER (from ABIM)

Clinical Reasoning

- From “Clinical Reasoning Skills (ca. 1975)
- To “Dual Process Models”
  - Analytic / Non-analytic
  - Fuzzy Trace
  - System 1 / System 2
- Explicit recognition of two kinds of knowledge
  - Formal / tacit or analytic / experiential
- Implication for Instruction and Practice

Content Specificity

- Whatever you measure / however you measure it
  - The correlation across observations (problems, samples) is 0.1 to 0.3
- Assessment methods like OSCE, MMI, MCQ
- Decline of “skills” (Problem-solving, critical thinking, self-assessment)

Simulation

- Recognition of potential but essential role of simulation in education
- From focus on “Fidelity” to critical task analysis
- Insufficient integration at curriculum level

Science of Teaching and Learning

- Fundamental understanding of the nature of human learning
  - Based on STWM – LTAM
- Implication (unfulfilled?) for instruction

The Evolution and Maturation of the Discipline of MER

- Increased sophistication of the Journals
  - Low acceptance rate
  - Increased impact factor
  - Greater theory focus
- Increased numbers of participants
  - PhD with expertise in social / behavioral science
  - MD with advanced training
- Increased educational opportunities
  - FAIMER
  - Maastricht, UIC, Dundee, Wilson, Erasmus

CHALLENGES FOR THE FUTURE

CHALLENGES FOR THE FUTURE

- Can Competency Based / Outcome Based Education deliver?
- How can we integrate simulation into the curriculum at UGME and PGME?
- Broadening admissions to assess “non-cognitive” factors

Can Competency Based Education deliver?

- To date, many descriptions of CBE, many countries adopting it.
- Operationalizing create hundreds of assessable objectives
- One (?) demonstration, structured on basic surgical skills (Reznick)
- Some evidence that assessment, using CANMeds roles, has problems
- Massive issues in assessing EPAs
  - Norman, Bordage, Norcini, 2013

Integrating simulation into the curriculum

- With changes in health care, need to use simulation
- To date, models are expensive, complicated
- Need to create simulations that are based on careful analysis of critical behaviours
  - E.g. IV insertion
- Need to create curricula integrating simulator
  - E.g. Mixedpractice for diagnosis

Broadening admissions process

- Good assessment of cognitive achievement
  - MCAT 2105, GAMSAT, etc.
- Some assessment of “non-academic factors”
  - MMI, CASPer.
- Not clear what is “non-academic factor”?
  - Is it skills? (Communication)
  - Is it personality (conscientiousness)
  - Is it attitudes (motivation, altruism)

CONCLUSIONS

- MEDICAL EDUCATION RESEARCH IS:
  - Progressive
  - Scientifically credible
  - Practically important
  - Valued by the medical community