



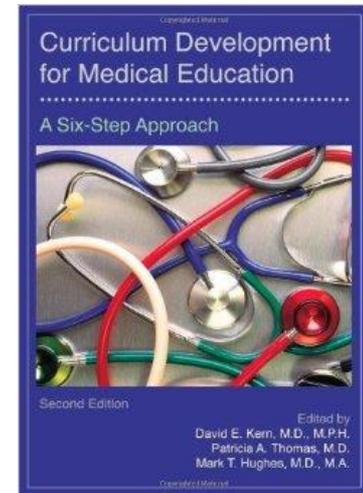
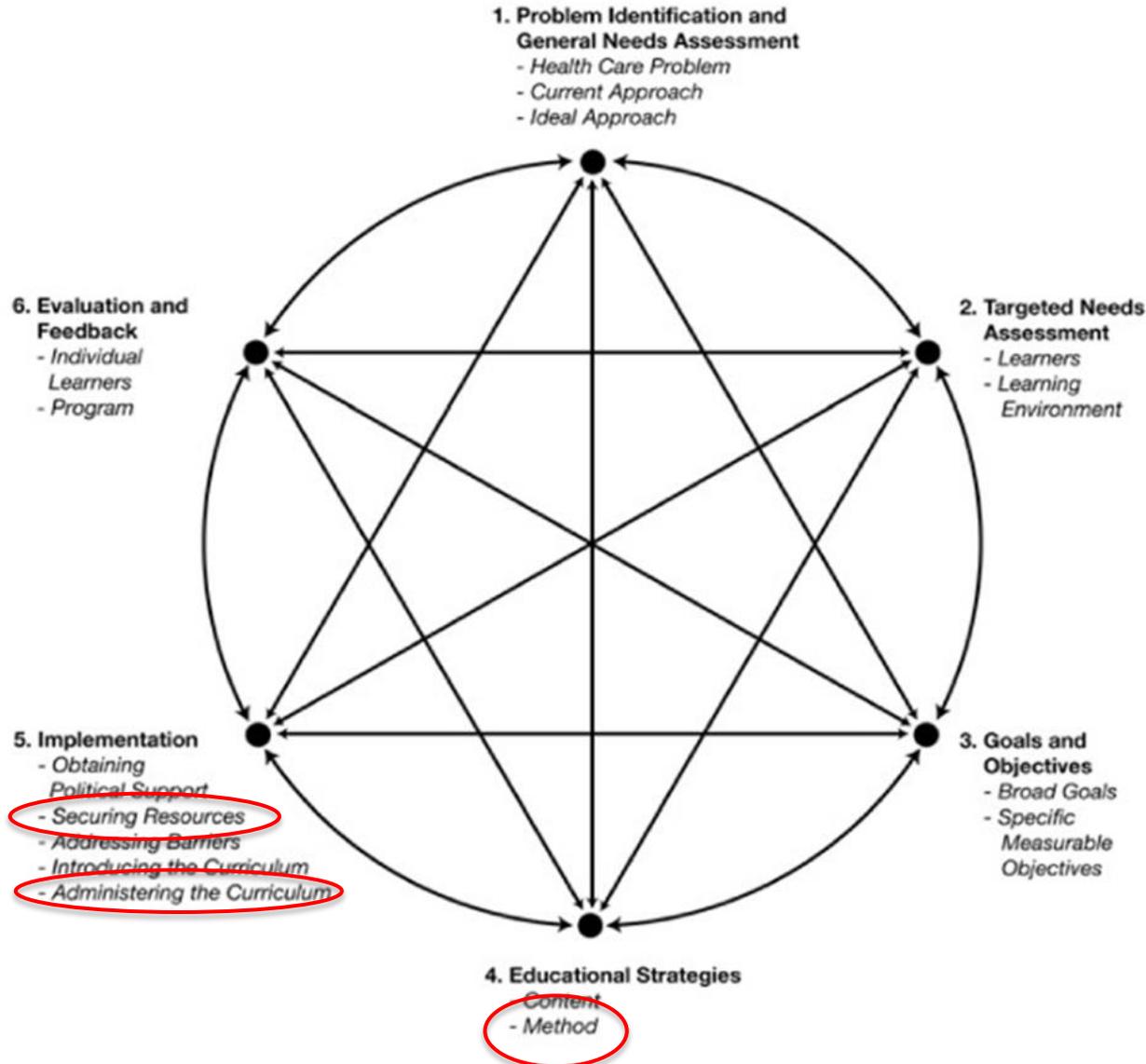
# Simulation: The Theory Practice Bridge?

Ms Dara O’Keeffe, MRCS  
Simulation Lead in Postgraduate Surgical Education

RCSI DEVELOPING HEALTHCARE LEADERS WHO MAKE A DIFFERENCE WORLDWIDE



# Developing Healthcare Education



Kern et al. Curriculum Development for medical Education. 2009. 2<sup>nd</sup> Ed. Johns Hopkins University press.

# Simulation in Education



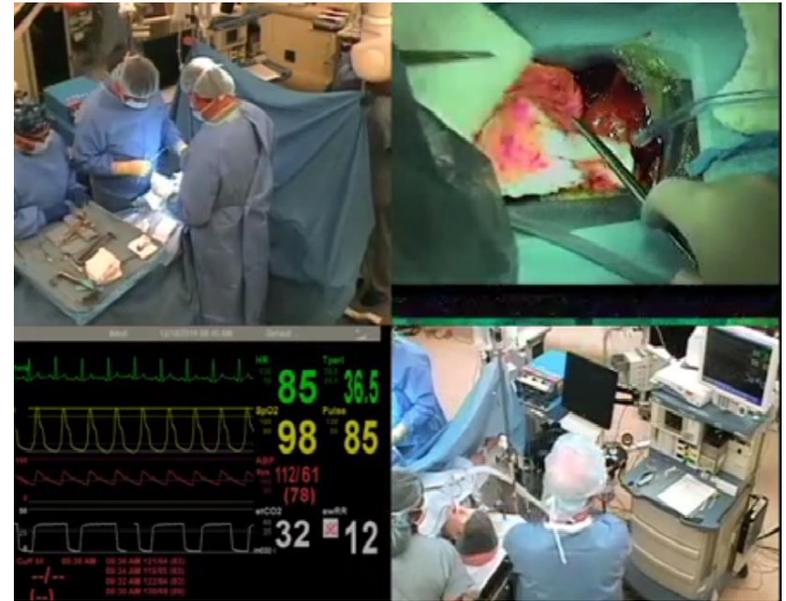
# Simulation in Healthcare Education

## Goals and objectives

“to do something in the simulation lab”



# Content Vs Instructional Method



# Does Simulation Work?

## Technology-Enhanced Simulation for Health Professions Education

A Systematic Review and Meta-analysis

*JAMA. 2011;306(9):978-988*

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Rose Hatala, MD, MSc

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**Context** Although technology-enhanced simulation has widespread appeal, its effectiveness remains uncertain. A comprehensive synthesis of evidence may inform the use of simulation in health professions education.

**Objective** To summarize the outcomes of technology-enhanced simulation training for health professions learners in comparison with no intervention.

**Data Source** Systematic search of MEDLINE, EMBASE, CINAHL, ERIC, PsychINFO,

**Conclusion** In comparison with no intervention, technology-enhanced simulation training in health professions education is consistently associated with large effects for outcomes of knowledge, skills, and behaviors and moderate effects for patient-related outcomes.

## Does Simulation-Based Medical Education With Deliberate Practice Yield Better Results Than Traditional Clinical Education? A Meta-Analytic Comparative Review of the Evidence

William C. McGaghie, PhD, S. Barry Issenberg, MD, Elaine R. Cohen, Jeffrey H. Barsuk, MD, and Diane B. Wayne, MD

*Acad Med. 2011;86:706-711.*  
First published online April 20, 2011

## Mastery Learning for Health Professionals Using Technology-Enhanced Simulation: A Systematic Review and Meta-Analysis

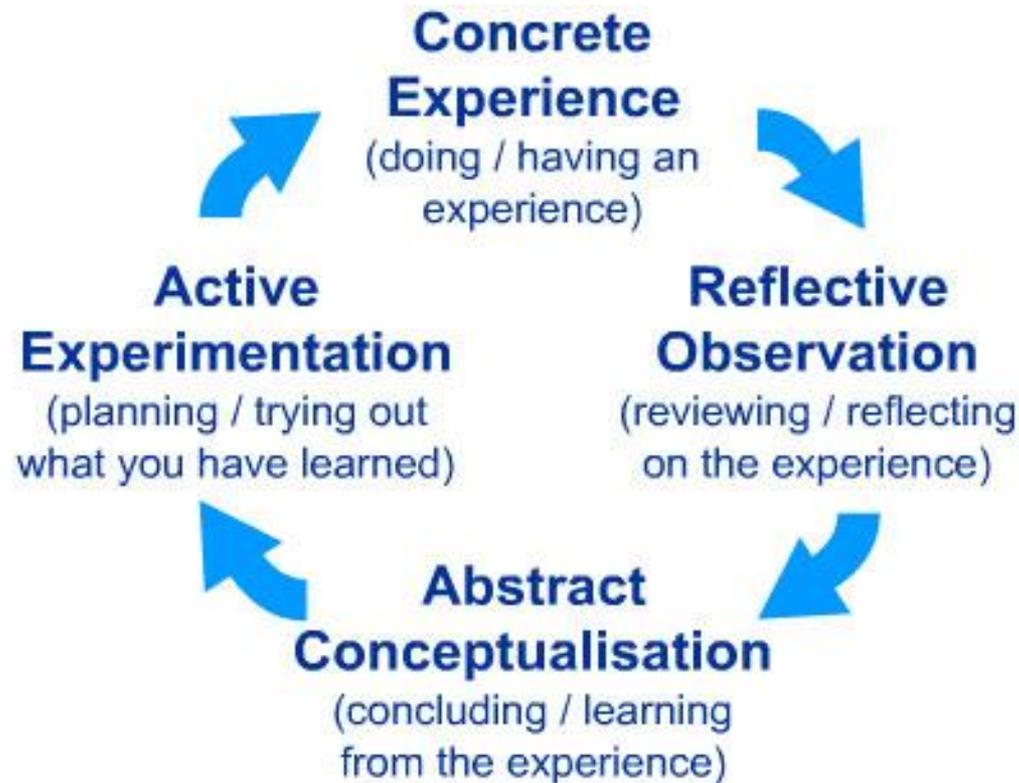
*Acad Med. 2013;88:00-00.*

David A. Cook, MD, MHPE, Ryan Brydges, PhD, Benjamin Zendejas, MD, MSc, Stanley J. Hamstra, PhD, and Rose Hatala, MD, MSc



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# Experiential learning theory



*Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development (Vol. 1). Englewood Cliffs, NJ: Prentice-Hall.*



# Deliberate practice



- Ericsson (2004<sup>1</sup>, 2006): 10,000 hours
- Repetitive performance of cognitive or psychomotor skills
- In a controlled setting
- Rigorous skills assessment.
- Specific, informative feedback based on skills assessment
- Results in increasingly better skills performance (*Issenberg et al. 2005*).

1. Ericsson KA. 2004. Deliberate practice and the acquisition and maintenance of expert performance in medicine and related domains. *Acad Med* 79(suppl 10):70–81.

# Does Simulation work for assessment?

- Transfer of skills
- Situated cognition
- Social educational theory

Systematic review

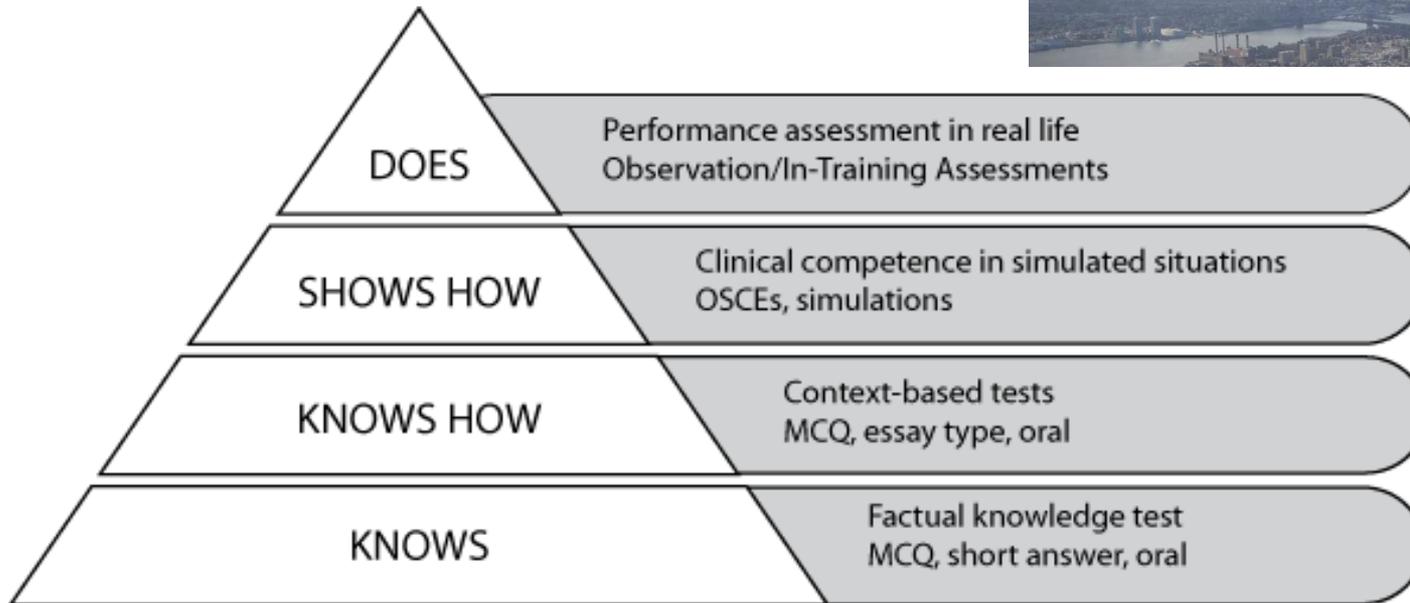


## Systematic review of skills transfer after surgical simulation-based training

S. R. Dawe<sup>1</sup>, G. N. Pena<sup>1,2</sup>, J. A. Windsor<sup>4</sup>, J. A. J. L. Broeders<sup>2</sup>, P. C. Cregan<sup>3</sup>, P. J. Hewett<sup>2</sup> and G. J. Maddern<sup>1,2</sup>

*BJS* 2014; **101**: 1063–1076

# Assessing The Theory Practice Gap



*Adapted from Miller, 1990.*

# CBME

MEDICAL  
TEACHER



## Outcomes based

- Assessment must be frequent
- Criterion-based, developmental trajectory
- Emphasis on preparation for practice, therefore must use robust work-based assessment
- Must use valid and reliable assessment tools
- Use quantitative and qualitative methods
- Decisions about competence should never be made by one individual

*Holmboe et al, Medical Teacher, 2010; 32: 676–682*

# Competency Based Training



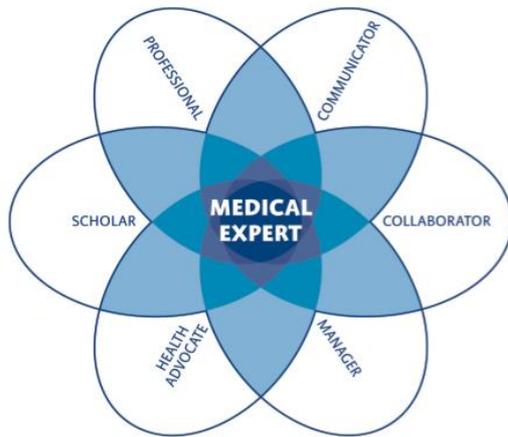
- Entrustable Professional Activities (EPAs)
- Statement of Awarded responsibility (STAR)
- ACGME milestone project
- Competence describes an observable ability in an individual
- EPAs describe a task (unit of practice)
- Criterion referenced V Norm referenced



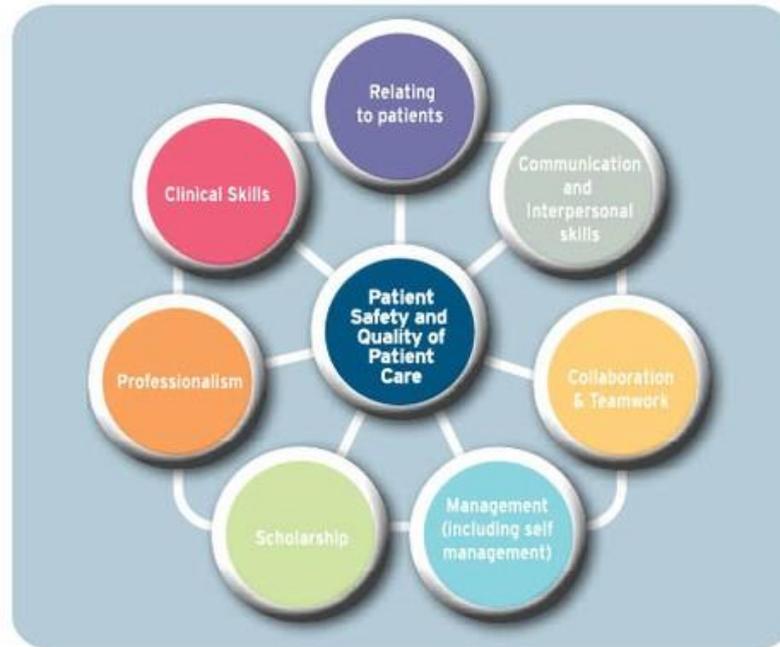
# Outcome Project

*Enhancing residency education  
through outcomes assessment*

## Next accreditation system



THE  
**CANMEDS**  
ROLES FRAMEWORK



RCSI

# EPA V competencies

Proficiency Level/ Level of supervision	1 Pre-practice	2 Directly Supervised Practitioner	3 Indirectly Supervised Practitioner	4 Independent Practitioner	5 Experienced Practitioner
Tick one:					

Practice Domain	Competency	Critical Deficiencies	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	
Performance of Operations and Procedures (POP)	PATIENT CARE (PC3)	This resident lacks basic surgical skills such as airway management, knot tying, simple suturing, suture removal, use of Doppler ultrasound, administration of local anesthetic, universal precautions and aseptic technique and is unable to reliably perform basic procedures, including venipuncture, arterial puncture, incision and drainage, minor skin and excisions placement of an IV, nasogastric tube, or urinary catheter.	This resident has basic surgical skills such as airway management, knot tying, simple suturing, suture removal, use of Doppler ultrasound, administration of local anesthetic, universal precautions, and aseptic technique, and is able to reliably perform basic procedures, including venipuncture, arterial puncture incision and drainage, minor skin excisions and placement of an IV, nasogastric tube, or urinary catheter. This resident can perform basic operative steps in " <a href="#">core operations/procedures</a> " of the SCORE curriculum.	This resident has respect for tissue, and is developing skill in instrument handling. This resident moves through portions of common operations without coaching and makes straightforward intra-operative decisions. This resident performs <i>some</i> of the "core" operations in the SCORE curriculum with minimal assistance.	This resident demonstrates proficiency in the handling of most instruments and exhibits efficiency of motion during procedures. This resident moves through the steps of <i>most</i> operations without much coaching and is making intra-operative decisions. This resident performs <i>many</i> of the "core" operations and is beginning to gain experience in the "advanced" operations.	This resident demonstrates proficiency in use of instruments and equipment required for "essential" operations, guides the conduct of most operations and makes independent intra-operative decisions. This resident can perform <i>most</i> of the "core" operations and has significant experience in the "advanced" operations.  This resident can effectively guide other residents in "core" operations.	
							<input type="checkbox"/>
		Comments:	Not Yet Assessable <input type="checkbox"/>				



# RCSI Trainee Assessment

Assessment category	Assessment title	Description	Number of assessment time-points
<b>Workplace Assessments (WA)</b>	<b>SSAOP:</b> Supervised Structured Assessment of Operative Performance	Direct observation of trainee by faculty trainer while performing operative procedure in vivo at appropriate level of competence.	9 assessments over 3 rotations
	<b>SCA:</b> Structured Clinical Assessment	Direct observation of clinical practice.	9 assessments over 3 rotations
	<b>Logbook of operative experience</b>	Detailed electronic logbook analysis for each of three rotations.	Assessment of case volume at three separate time points
	<b>Trainer reports</b>	Trainee evaluation by senior trainer on completion of clinical rotation.	3 assessments over 3 rotations
<b>RCSI assessments</b>	<b>Case-based online course work</b>	Participation in online discussion and analysis of clinical cases. 10 cases per rotation.	3 assessments of 10 cases each
	<b>Technical Skills OSCE</b>	Objective structured technical skills assessment in the skills laboratory using simulated models.	2 multistation OSCEs, 9 months apart
	<b>Non-technical skills OSCE</b>	Objective structured non-technical skills assessment using simulated patients.	2 multistation OSCEs, 9 months apart

# Assessment in Simulation



## Human Factors OSCE Score Sheet



Communication Skills Process	Good	Adequate	Not Done	N/A
<b>Initiating the Session</b>				
Introduces self and role, greets individual using their name				
Outlines purpose of the encounter and brief plan of what will be discussed				
Assesses individual's starting point				
<b>Building the relationship</b>				
Listens attentively, minimising interruption and leaving space for replies				
Demonstrates appropriate non-verbal behaviour e.g. eye contact, posture and position, facial expression, use of voice				
Uses empathy to communicate appreciation of the individual's feelings or predicament				
<b>Aiding accurate recall and understanding</b>				
Structures interview in logical sequence, attends to timing, keeps interview on task				
Chunks information and checks individual's understanding, using their response to guide next steps				
Uses clear language, avoids jargon and confusing language				
<b>Achieving a shared understanding: incorporating the other individual's perspective</b>				
Progresses from one section to another using signposting; includes rationale for next section				
Encourages individual to contribute reactions, feelings and own ideas				
Picks up and responds to verbal and non-verbal cues (body language, facial expression)				
<b>Shared decision making, planning and closure</b>				
Explores management options with individual				
Appropriately negotiates mutually acceptable action plan				
Summarises session briefly and clarifies plan of care				

Scenario specific content	Good	Adequate	Not Done	N/A
Displays appropriate level of clinical knowledge for year of training and speciality				
All statements of clinical facts are correct				
Reassurances and planned actions are reasonable/realistic within the current healthcare environment				

What is the overall competence of this candidate? (independent of the scores above)

Excellent  Pass  Borderline  Fail



## Operative Skills Score Sheet 2016

Candidate Name or Number: \_\_\_\_\_

Assessor Name (legible): \_\_\_\_\_

Date: \_\_\_\_\_ Time: \_\_\_\_\_

### Procedure: VEIN PATCH

**Instructions:** Carry out a longitudinal arteriotomy. Excise an ellipse of vessel 2cms x 0.75cms approx. Close arteriotomy with a vein patch. You may request assistance.

VEIN PATCH	Done	Not Done
<b>Arteriotomy</b>		
Correct stab arteriotomy (used no 11 blade with cutting edge superiorly)		
Used Potts scissors and identified it by name		
Adequate arteriotomy opening (2cms x 0.75cms approx.)		
<b>Vein patch</b>		
Appropriate patch size (equal or larger than arteriotomy opening)		
Correct suture selection (4/0 – 6/0 Prolene double ended)		
Grasped needle and not suture material directly with instruments		
<b>Suturing technique</b>		
Passed needle inside to outside on artery		
Used backhand suturing technique on the wall away from operator		
Final reef knot placed on the long edge of the arteriotomy and not at apex		
Hand tied reef knots performed (not instrument tie)		
Gentle handling of vessels throughout		

GLOBAL RATING SCALE
Based on an overall impression of the candidate's surgical proficiency, please allocate a global score from 1-4. (1 = Poor 2 = Fair 3 = Good 4 = Excellent)



# Direct Observation of Procedural Skills (DOPS)



Operative Procedure (Max 80 marks).	Very poor. Unacceptable for level of training (2)	Below expectations for level of training (4)	Meets expectations for level of training (6)	Above expectations for level of training (8)	Exceptional. Capable of performing independently (10)	N/A
<i>Please indicate the degree to which trainee:</i>						
7. Plans & makes incision(s) taking into account procedure & prior surgery.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Chooses appropriate surgical instruments (including sutures).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Uses surgical instruments (includes diathermy, stapler etc.) in a manner that is safe (i.e. visualizes tips) & demonstrates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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# Multiple Mini Interview

Interview (MMI)	MMI Station Titles	No. of Assessments
	<ol style="list-style-type: none"><li>1. Quality and Safety in Surgical Healthcare</li><li>2. Commitment to Academic Advancement and Lifelong Learning</li><li>3. Knowledge of Current Issues Relevant to Surgical Practice</li><li>4. Decision Making in Surgery</li><li>5. Professionalism and Probity in Surgical Practice</li></ol>	5 MMI stations with 3 independent raters per station.

Over the two year period, each trainee is assessed 24 times in the clinical environment, seven times in the academic department and at five stations during interview.

**Table 3. Assessment-Level Statistics: Correlations**

Component	Assessment	Item-Total Correlation	Mean Inter-Item Correlation
Workplace Assessments	SSAOP	.85	.62
	SCA	.87	.61
	E logbook	.69	.73
	Trainer Reports	.67	.75
RCSI Assessments	Case Based Discussions	.71	.57
	TS OSCE	.69	.60
	NTS OSCE	.64	.66
MMI	Station 1	.82	.73
	Station 2	.87	.71
	Station 3	.81	.74
	Station 4	.82	.73
	Station 5	.79	.75
	Workplace Assessments	.88	.85
	RCSI Assessments	.96	.65
	MMI	.79	.93

**Table 4. Generalizability Study: Variance Components and Reliability**

Component	Effect	<i>df</i>	VC	%VC	G-Coefficient	Φ-Coefficient
Workplace Assessment	person ( <i>p</i> )	55	3.996	7.4%	.619	.611
	assessment ( <i>a</i> )	3	28.464	52.8%		
	rotation ( <i>r</i> )	2	.104	.2%		
	<i>p</i> x <i>a</i>	165	3.551	6.6%		
	<i>p</i> x <i>r</i>	110	6.379	11.8%		
	<i>a</i> x <i>r</i>	6	0.816	1.5%		
	<i>p</i> x <i>a</i> x <i>r</i> , error	330	10.606	19.7%		
RCSI Assessments	person ( <i>p</i> )	55	16.959	9.0%	.645	.601
	assessment ( <i>a</i> )	2	94.260	49.9%		
	component ( <i>c</i> ) : <i>a</i>	4	13.070	6.9%		
	<i>p</i> x <i>a</i>	110	.818	.4%		
	<i>p</i> x ( <i>c</i> : <i>a</i> ), error	220	63.808	33.8%		
MMI	person ( <i>p</i> )	36	333.041	68.4%	.936	.935
	station ( <i>s</i> )	4	.000	.0%		
	rater ( <i>r</i> )	2	.000	.0%		
	<i>p</i> x <i>s</i>	144	77.338	15.9%		
	<i>p</i> x <i>r</i>	72	9.901	2.0%		
	<i>s</i> x <i>r</i>	8	4.091	0.8%		
	<i>p</i> x <i>s</i> x <i>r</i> , error	288	62.317	12.8%		

Note:

1. The composite score reliability based on current weight configurations is .891.

*Figure 1. Projections in Reliability by Assessment Component: Decision Study*

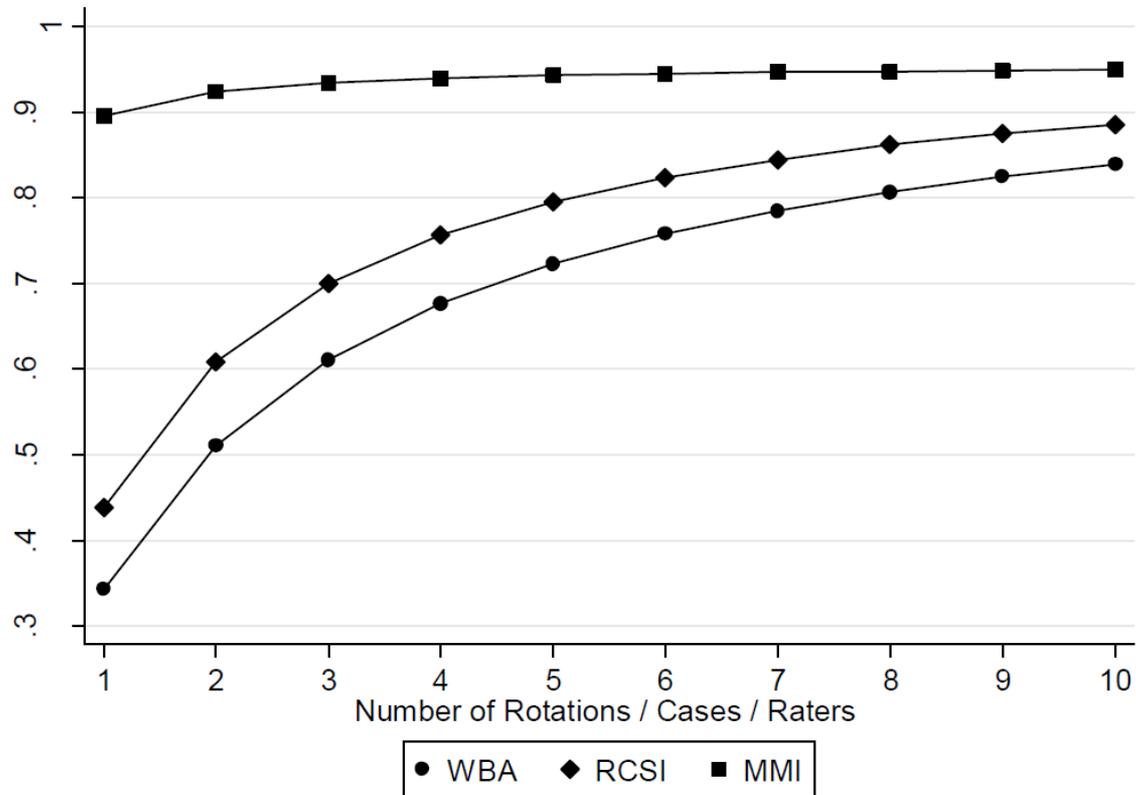
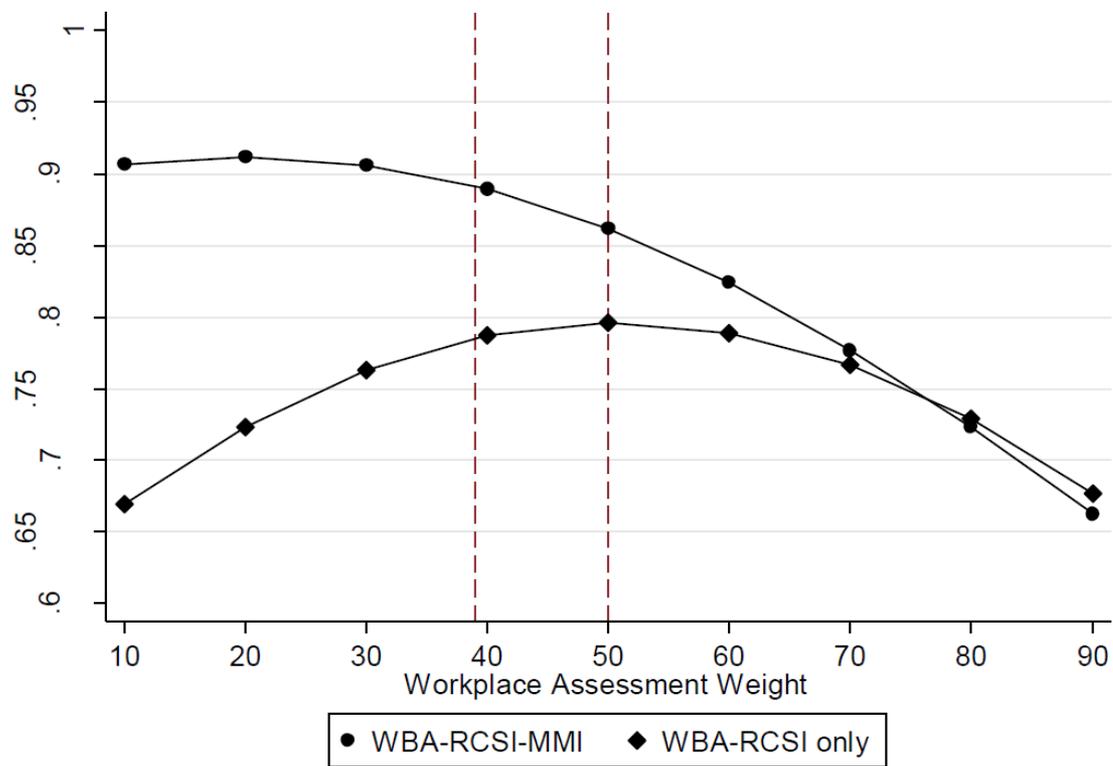


Figure 2. Composite Score Reliability by Weight



# Simulation: the theory practice bridge?



- In competency based training, the only metric that really matters is the one you make a decision on.
- Multiple measurements will allow you to stand over your decision.
- Simulation can play a vital part in assessing the bigger picture of an individual's competence.