Linking Medical Education Research and Practice

Heeyoung Han, PhD

Department of Medical Education
Southern Illinois University School of Medicine

July 28, 2016

Dr. Han indicated she has no financial relationships to disclose relevant to the content of this CME activity.
Mission of Des Moines University

To improve lives in our global community by educating diverse groups of highly competent and compassionate health professionals
Southern Illinois University School of Medicine

• Mission
  • improving the health of the people of central and southern Illinois through its four-fold mission of education, clinical care, research, and community service.

• Learners & Faculty
  • Medical students – 290
  • Residents and fellows – 338
  • MEDPREP: 62 students (100% minority)
  • Faculty - 338 full-time, 37 part-time and 956 volunteers (all sites)
Innovative Medical Education

- Problem-Based Learning (PBL)
- Standardized Patient

Howard Barrows, M.D.
Southern Illinois University School of Medicine

AMEE: An International Association For Medical Education 2013

Student Engagement
Assessment
Social Accountability
Workshop Outline

• Understand medical education research
• Exercise 1 – Create a research question
• Exercise 2 – Design medical education research
• Publication and dissemination approach
• Case Presentation
  • My medical education research experiences
What is Educational Research?

Definition

• Education research is the scientific field of study that examines education and learning processes and the human attributes, interactions, organizations, and institutions that shape educational outcomes.

Source from American Educational Research Association (AERA)
What is Educational Research? (cont.)

Purpose of educational research

• Scholarship in the field seeks to describe, understand, and explain how learning takes place throughout a person’s life and how formal and informal contexts of education affect all forms of learning.

Source from American Educational Research Association (AERA)
What is Educational Research? (cont.)

Methods

• Education research embraces the full spectrum of rigorous methods appropriate to the questions being asked and also drives the development of new tools and methods.

Source from American Educational Research Association (AERA)
Types of Educational Research

• Literature review
• Empirical vs. non-empirical study
• Quantitative vs. qualitative study
• Mixed methods
• Program evaluation
Difference between basic science research and educational research

- Basic research
- Applied research
Difference between basic science research and educational research

- Context specific
- Hard to have a randomized control
- Practice driven
Medical Education Research and Practice

Messy!
Roles of Medical Education Research

• Create evidence for medical education practice
• Inform curriculum and educational program for continuous improvement
• Predict students’ success or failure
• Contribute to an existing body of knowledge in the field
Exercise #1
Create a Research Question
Small group activity

• Using worksheet #1, reflect on your teaching practice and experience and write down your responses to each question.

• Share with your small group

• Decide on one topic as a group

• Present it to the whole group
Good medical research questions

• Aligned with the school mission
• Concrete, not too broad, not too narrow
• Significance
• Finding a gap in the literature
• Guiding medical education practice
• Feasible, researchable
• Publishable
Methods

• Empirical vs. Non-empirical

• Qualitative vs. Quantitative
  • Different perspectives

• Mixed methods
  • Multi methods research

• Program Evaluation
Research paradigm

Inquiry

Quantitative
- Positivism

Qualitative
- Constructivism

What is reality? (Ontology)
How do we know? (Epistemology)
Research paradigm

<table>
<thead>
<tr>
<th></th>
<th>Positivism</th>
<th>Constructivism</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is reality?</td>
<td>An absolute truth out there</td>
<td>Multiple realities socially constructed through experiences</td>
</tr>
<tr>
<td>How do we know?</td>
<td>Measuring observed activities</td>
<td>Exploring subjective experiences in context</td>
</tr>
<tr>
<td>Inquiry</td>
<td>Quantitative</td>
<td>Qualitative</td>
</tr>
<tr>
<td></td>
<td>Deductive - Hypothesis testing</td>
<td>Inductive exploration</td>
</tr>
</tbody>
</table>
Positivism

Constructivism
Research design elements

• Setting
• Participants
• Data sources
• Data analysis
Exercise #2
Design of Methods
Exercise #2 - Methods

• Using the research question that your group presented, discuss each question in worksheet #2 and write down the group consensus in the whiteboard.

• Present it to the whole group
Conducting a study

• Interdisciplinary collaboration
  • Content expert
  • Research method expert
  • Multiple institutions

• IRB approval

• Grant
  • CGEA mini grant
  • The Society of Directors of Research in Medical Education
Publication of research

• Find a journal - Fit to the journal aims
  • Academic Medicine
  • Medical Education
  • Medical Teacher
  • Teaching and Learning in Medicine (TLM)
  • Advances in Health Sciences Education
  • The Clinical Teacher
  • Journal of Graduate Medical Education
  • Open-access journals

• Find a home for your paper!
Alternative format of publications

• MedEdPORTAL
• Book Reviews
• Twelve Tips (Medical Teacher)
• Really Good Stuff (Medical Education)
• Conversation Starters (TLM)
Why rejected

- No significance
- Unplanned
- Poor research design
- Lack of depth
  - Program evaluation without in-depth explanation of why and how
  - Satisfaction survey
My medical education research experience
- Research to practice
- Practice to research

Continuous dialogue with practice
Third Year Medical Students - Clerkships
Literature

• Socialization and professional identity formation (Lindberg, 2009; Weaver, et al., 2011; Krupat, et al., 2011)

• Transition from non-clinical to clinical medical student (Teunissen & Westerman, 2011)

• Student struggles in clerkships (O’Brien, et al., 2007)
Research Questions

• What are medical students’ learning expectations for clerkship?
• What do they learn about practicing medicine through their clerkship experience?
• How do they learn about practicing medicine through their clerkship experience?
Perspective on Learning

• Situated Learning
  • Learning as participation in the social world
  • How a newcomer becomes an experienced member of a community

“Legitimate peripheral participation... (It) is an analytical viewpoint on learning, a way of understanding of learning (Lave & Wenger, 1991, p 40)”
Methods

• Longitudinal qualitative research

• Data Source
  • Three interviews of each participant across their clerkship year (2011-2012):
    • pre-clerkship
    • mid-clerkship
    • after-clerkship
  • Observations of each participant during a day of their clerkship experience
Methods (cont.)

• Interview Protocol
  • Pre-clerkship interview
    • Prior health professional experience, learning expectations and concerns about clerkships
  • Mid-clerkship interview
    • Comparing actual experience with expectations
    • Applying medical knowledge to clerkship work
    • Relationship building
    • Learning norms
  • After-clerkship interview
    • Confidence change in application of knowledge
    • Unwritten rules
    • Improve clerkships
Methods (cont.)

• Exempt from IRB review
• Twelve participants of 78 Year3 students
  • Female: 7
  • Male: 5
• Data Analysis
  • Open coding and axial coding using ATLAS.ti
Findings

<table>
<thead>
<tr>
<th>Learning Expectations</th>
<th>Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands-on experiences</td>
<td>Limited hands-on experiences</td>
</tr>
<tr>
<td>Being more knowledgeable (Clinical reasoning)</td>
<td>Limited opportunities to practice diagnostic thinking</td>
</tr>
<tr>
<td>Realistic learning</td>
<td>Confidence increased in interactions (Socialization)</td>
</tr>
<tr>
<td>Decision on a specialty</td>
<td>Found people/specialty</td>
</tr>
</tbody>
</table>
Why did they have limited opportunities to practice diagnostic thinking?

Let’s look at their learning process.
Legitimate Peripheral Participation

Lave & Wenger (1991)
Findings

However, it did not happen in our clerkships. Instead...

- No immersive experience
- Limited learning relationship building
- Short term relationship
- Hiding for studying
- Impression management
- Expert Central Practice
- Novice
Learning in the real place: Medical students’ learning and socialization in clerkships at one medical school (Han et al., 2015)
Tracking development of clinical reasoning ability across five medical schools using a progress test (Williams, et al., 2011)

Diagnostic pattern recognition

Clinical data interpretation

Figure 1: Mean performance (with 95% confidence intervals) on a 2008 test measuring diagnostic pattern recognition for 2,394 students with zero, one, two, or three years of training in five medical schools.

Figure 2: Mean performance (with 95% confidence intervals) on a 2008 test measuring clinical data interpretation for students with zero, one, two, or three years of training in five medical schools.
“The emperor has no clothes!”

Debra Klamen, MD, MHPE
Associate Dean for Education & Curriculum
Professor and Chair, Dept of Medical Education

Klamen (2016)
Medical research changes practice
Disclosure

• Josiah Macy Jr. Foundation Grant
Problems that we identified in the clerkship curriculum

1. Clinical reasoning is not learned in traditional clerkships.
2. The current clerkship structure does not work for apprenticeship and clinical immersion.
   • Socialization into medicine is important but has been neglected.
Clinical Reasoning Curriculum

Critical Clinical Competencies CCC (online learning system)

• We aimed to address this issue by introducing a new curriculum modality designed to develop medical students’ clinical reasoning skills through deliberate practice on contrasting cases with expert cognitive role-modeling.

(Ericsson et al., 1993; Schwartz & Bransford, 1998; Lave & Wenger, 1991)
Three-year longitudinal, online, interactive video-based curriculum

- 144 discrete conditions associated with 12 chief complaints
  - 12 “long cases” and 3 “contrasting cases” for each long case
  - 48 discrete cases for each training year
<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue</td>
<td>Diagnosis 1 3 contrasting cases</td>
<td>Diagnosis 2 3 contrasting cases</td>
<td>Diagnosis 3 3 contrasting cases</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>Pneumonia (Pneumothorax, COPD, CHF)</td>
<td>Asthma</td>
<td>PE</td>
</tr>
<tr>
<td>Chest pain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal Bleeding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back Pain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dizziness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cough</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdominal Pain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mood Change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edema</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headache</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 year longitudinal curriculum

12 Chief Complaints

144 discrete diagnoses

**Deliberate Practice**
Clinical Reasoning Practice and Modeling Process

1. Chief Complaint
2. Generate Differential + Justification
3. View Expert Panel Discussion
4. Compare Reasoning to Experts’

Expert Role Modeling
Contrasting Cases
Level 1

Chief Complaint: Back Pain

What is your differential diagnosis at this point?

Revise your DDX based on this new information.

Demo test (Student input)

Why?

Type your explanation for why you chose certain diagnoses and not others.

Demo test (Student input)
Level 1

Chief Complaint: Back Pain

Your Current Differential Diagnosis

Demo test (Student input)

Your Current Diagnostic Justification

Demo test (Student input)

Continue ➔
Level 1

Chief Complaint: Back Pain

Experts' Differential Diagnosis

1. Musculoskeletal Disorder
   1.1 Muscle strain
   1.2 Disk problem (herniation)
   1.3 Osteoarthritis (chronic degenerative process)
2. Inflammatory process of spine
3. Chronic muscle inflammation
4. Nerve Compression of the Spine Secondary to a Tumor
   4.1 Prostate cancer
   4.2 Colon cancer

How does your differential compare with the experts?

How many total diagnoses are on your list?
How many of your diagnoses are on the experts list?

Your Current Differential Diagnosis

Demo test (Student input)
Level 1

Chief Complaint: Back Pain

Thought Question

What related symptoms and risk factors would help you refine your differential diagnosis?

Type your answer here.
Expected Learning Outcomes

• We expect to see a steady increase in clinical reasoning development throughout all three years of the curriculum.
Innovation Strengths

• Theory-based approach to developing clinical reasoning skill.
• Ability to detect students who struggle with clinical reasoning earlier in the curriculum.
• Provides a framework for progressive performance assessment.
• Fosters a performance-assessment culture that emphasizes diagnostic justification.
Feasibility and Transferability

• The CCC curriculum is a web-based online curriculum that can easily be utilized by other medical schools.
• It also features a case-authoring and management system, which allows educators to edit cases without programmer help.
Problems that we identified in the clerkship curriculum

1. Clinical reasoning is not learned in traditional clerkships.

2. The current clerkship structure does not work for apprenticeship and clinical immersion.
   • Socialization into medicine is important but has been neglected.
Y3 (clerkships) Curriculum transformation

Learning Objectives
Let’s be realistic!

1. Socialization into medicine
2. Find your people
Y3 (clerkships) curriculum transformation

Structure

• 12 months → 8 months Core and 4 months Personalized Education Plan (PEP)
  • Core: Socialization into medicine (4 week immersive clinical experience)
  • PEP: Individualized path for deep dive, Early remediation if necessary
Y3 (clerkships) curriculum transformation

- Embracing the realities of clinical environments
  - Idiosyncrasy and opportunistic
- One student-to-one attending for 4 weeks
  - Adopting coaching model
  - Legitimate peripheral participation
- No lectures
  - Khan videos like video resources
- No shelf exams
- Clerkship advisor for 8 months
  - Mentoring and reflections
Y3 (clerkships) curriculum transformation

Assessment

• Focusing on clinical learning and performance, not shelf exam scores for honors
• Direct observations and immediate feedback
• Reflections
• Longitudinal development
• Embracing subjectivity
Isn’t subjectivity bad for assessment?

Toward Authentic Clinical Evaluation: Pitfalls in the Pursuit of Competency.

“Our study reinforces and adds evidence to the growing concern regarding pitfalls in the pursuit of objectivity, by showing that assessment of residents’ performance in the clinical setting is still, despite concerted efforts to promote standardized competency frameworks, heavily influenced by the subjective. But this should not be considered a failure.”(Ginsburg et al., 2010, p. 786)
Change Process

• Y3T committees
  • Advisory committee
  • Core committee
  • PEP committee
  • Assessment committee
  • Faculty Development committee
  • Program Evaluation committee

The new clerkship has started this month!
# Student-centered, participatory program evaluation

## Two-Step Approach

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Clerkship Curriculum</td>
<td>New Clerkship Curriculum</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activity</th>
<th>Traditional Clerkship Curriculum</th>
<th>New Clerkship Curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3 student reflective journaling of their own clerkship experiences in the traditional clerkship</td>
<td>M4 students observation of M3 students – Comparing it with their own experiences</td>
<td></td>
</tr>
<tr>
<td>Focus groups with their peers in traditional clerkship</td>
<td>Focus groups with new clerkship students – Comparing prior focus group data with new experiences</td>
<td></td>
</tr>
<tr>
<td>Preparing M3 Students for Program Evaluation</td>
<td>M4 Students Conducting Program Evaluation</td>
<td></td>
</tr>
</tbody>
</table>
My medical education research experience
- Research to practice
- Practice to research

Continuous dialogue with practice
Introduction

• Physician-patient communication is an important skill

• ACGME core competency

• Internal Medicine reporting milestone # 20

• We started Resident Audio Recording Project (RAP) in 2008
Resident Audio-recording Project (RAP)

• Three-step process
  1. Resident physician records real patient encounter
  2. Transcribed recording is evaluated by a panel (physicians and lay members)
  3. Resident self evaluation followed by panel mentor feedback

• 1 RAP per year (3 total over residency)

• Total time per RAP is 4-6 hours
  • 30-60 min for resident to record encounter
  • 90 min for attending physicians and lay members to evaluate during the group review
  • 90 min for resident to review recording & receive feedback
  • 30 min for attending physician to provide feedback to resident
Doctor: Okay. And, a, nice to meet you, ma'am. So how's everything going on with you?

Patient: A, so-so right now.

Doctor: So-so.

Patient: I've had--I had a fall in my kitchen (????) and tore my knee up a little bit. And--

Doctor: Can you be louder, ma'am?

Patient: I tore my left knee up a little bit.

Doctor: Right.

Patient: I, a--a fracture—a stress fracture in there. And then I've got torn meniscus.

Doctor: Right. Right.

Patient: So, I'll be doing therapy starting, oh, I go for a consultation on Friday.
Resident Audio-Recording Project Evaluation – Clinic

1. Opening the Interview
   a. Self-introduction
      - Gives own name
      - Tells their training level and attending physician’s name
      - Tells who they work for (Dept. of Medicine)
      - Asks how the patient wants to be addressed
   b. Solicited patient’s presenting concerns
      - Inquires about what brought them to the clinic
      - Summarizes concerns back to the patient for clarity
      - Compiles & prioritizes list of patient concerns

2. Attitudes
   a. Nonjudgmental
      - Does not show disdain for life-style choices
      - Attempts to treat illness regardless of non-adherence
   b. Involves patient appropriately in process
      - Lets the patient tell their story
      - Responds with appropriate number of “Ok”, “Yes”, etc.

3. Interpersonal Skills
   a. Engages patient
      - Keeps patient on track—did not allow to ramble
      - Communicates doctor’s interest in patient’s problems
      - Effectively draws patient (and family) into conversation
   b. Empathetic
      - Shows an understanding of the patient’s feelings
      - Seems comfortable with patient

   Listening abilities
   - Does not interrupt patient unnecessarily
   - Allows full story to unfold
   - Does not become frustrated with patient’s communication ability
   - Does not repeat questions patient already answered

4. Control of Interview
   a. Questioning strategies
      - Uses open-ended questions often
      - Does not group multiple questions in one question
      - Does not use many leading questions
      - Uses appropriate English words
   b. Allows issues to be fully defined and explored
      - Lets patient define own problem
      - Follows-up on stated problem with exploratory questions
      - Gives patient enough time without interrupting
   c. Allows venting when appropriate
      - Allows patient to express frustrations
      - Shows empathy for patient’s frustrations and problems
   d. Confronts when necessary
      - Keeps patient know where problems exist
      - Confronts patient without challenging them
   e. Keeps appropriate tempo
      - Lets patient talk without allowing rambling
      - Keeps own questions and stories precise and appropriate
      - Moves interview and exam as fast as safe and reasonable
   f. Shifts topics as necessary
      - Moves patient through all presenting concerns
      - Explores for hidden or embarrassing concern that is yet unexpressed
      - Moves patient off concern once fully explored
   g. Follows logical progression
      - Topic transition clear and reasonable
      - All patient issues addressed in logical or dar
• Alphabetic scores were converted into numeric scores for analysis and comparisons.

0 = U (Unsatisfactory)
1 = M (Marginal)
2 = S (Satisfactory)
3 = A (Above average)
4 = E (Exemplary)
Feedback to the Resident

• With panel evaluation form

• Self-evaluation without listening to the audio

• Without panel evaluation form

• Self-evaluation with listening to the audio with transcript
Question

• We have been providing feedback on patient-physician communication to the residents for 7 years. However, do we know:

1. What are the most common themes?
2. What are the most common positive feedback themes?
3. What are the most common corrective feedback themes?
Method

• Retrospective review of the feedback data provided by a senior faculty between 2008 and 2013. (n=53)
• Three researchers reviewed the feedback data and coded each feedback items.
• During the analysis, new codes were developed and added to the data collection sheet.
• The data were then compiled to extract
  1. Most recurring feedback items (combined positive and negative)
  2. Positive feedback items only and
  3. Negative feedback items only.
## Findings

<table>
<thead>
<tr>
<th>Existing Framework</th>
<th>Emerged Themes</th>
<th>Descriptions of Themes</th>
<th>Total feedback N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share information</td>
<td>Patient education</td>
<td>To educate patient on disease, treatment, or healthier behaviors by providing unsolicited explanation, checking patients’ understanding of what is discussed and clarify patient’s misunderstanding.</td>
<td>119</td>
</tr>
<tr>
<td></td>
<td>Thoroughness</td>
<td>To get all work done thoroughly without missing anything.</td>
<td>67</td>
</tr>
<tr>
<td>Control of interview</td>
<td>Organization/control</td>
<td>To make the interview organized and controlled.</td>
<td>61</td>
</tr>
<tr>
<td>Gather information</td>
<td>Questioning strategy</td>
<td>To use appropriate questioning strategies by using open-ended questions rather than leading questions without grouping questions.</td>
<td>60</td>
</tr>
</tbody>
</table>
Findings (cont.)

• Negative feedback
  • Patient education
  • Thoroughness
  • Management
  • Holistic exploration of patient’s problem

• Positive feedback
  • Patient education
  • Empathy
  • Organization/control
Reception of Feedback by Residents

- Overall, better reception without panel evaluation form; self-evaluation listening to the audio with transcript and a narrative feedback worked best
Narrative evaluation tool

Individual Feedback Form

1. Opening/inter/Agenda Setting
   Full introduction if applicable. Allow the patient to complete his/her opening statement, click the patient’s full name of nursing, set agenda.
   Strengths & Weaknesses: Line #

2. Gather information
   Open-ended questions, logical progression, topic transition, no grouping questions, summarize information, active listening.
   Strengths & Weaknesses: Line #

3. Understand the Patient’s Perspectives
   Explore contextual factors (e.g., cultural, socioeconomic environment), explore beliefs, concerns, and expectations about health and illness, acknowledge and respond to the patient’s ideas, feelings, and values.
   Strengths & Weaknesses: Line #

4. Share information
   Use language the patient can understand, check for understanding, encourage questions.
   Strengths & Weaknesses: Line #

5. Patient Education
   Promote health behavior change, teach back.
   Strengths & Weaknesses: Line #

6. Shared Decision Making
   Encourage the patient to participate in decisions to the extent he or she desires, check the patient’s willingness and ability to follow the plan.
   Strengths & Weaknesses: Line #

7. Closing/Summation
   Summarize and affirm agreement with the plan of action, establish a priority list about the working diagnosis, management for each issue clear, identify and enlist resources and supports, ask whether the patient has other issues or concerns, discuss follow-up (e.g., next visit, plan for unexpected outcomes).
   Strengths & Weaknesses: Line #

8. Building Relationship/Support
   Establish/maintain a personal connection, encourage a partnership between physician and patient, respect patient’s active participation in decision making, treat the patient with respect, engage patient. Third party inclusion, Empathetic, Nonjudgmental, Allow venting, Confronts when necessary, Gives compliments, Peachtree encourages or shares optimism.
   Strengths & Weaknesses: Line #

9. Control of Interview
   Always appropriate range. Collaborate control.
   Strengths & Weaknesses: Line #

10. Communication Intelligibility
    Speed of talking (not too fast/nor slow), interruptions (Overtalks), English (grammar), Voice modulation, Appropriate responses (non-meaningful ON - Backchannel).
    Strengths & Weaknesses: Line #
Group Feedback Form

General impression

Three major areas of strengths

Three major areas for improvement

Recommendation/follow-up

Qualitative comments

Quantitative score

ACEME Rating:

Scale:
1. Resident not ready to conduct interview without attending physician in room.
2. Resident not ready to fully conduct interview alone. Attending physician needs to intermittently observe resident.
3. Resident is able to conduct interview but requests attending physician to be present. Attending physician intermittently observes resident.
4. Resident is able to complete interview with attending physician as needed.
5. Resident is able to interview patient independently. No supervision required.
6. Resident is exemplary. (She could teach others how to interview patients.)
This practice made us think

• Prescribed conceptual frameworks provide abstracts of what we are assessing but may miss something that exists in real patient care.

• And we had another research question
  • What constitutes physician-patient communication skills in real patient encounter contexts?

• So, now we are studying
  • What experts refer to when they speak about physicians’ communication competence and what is treated as important in a real patient-care context when they evaluate residents’ communication skills during patient encounters.
Methods

• Setting and participants
  • RAP evaluation panels

• Data source
  • One year of audio recording of RAP panel evaluation discussions

• Data analysis
  • Qualitative data analysis using grounded theory
Linking Medical Education Research and Practice
References


• Klamen DL et al. Competencies, milestones, and EPAs – Are those who ignore the past condemned to repeat it? Medical Teacher. 2016 Jan 25:1-7 [Epub ahead of print]

• Klamen DL. Getting Real: Embracing the Conditions of the Third-Year Clerkship and Reimagining the Curriculum to Enable Deliberate Practice. Academic Medicine. 2016;90(10): 1314–1317


Thank you!

Heeyoung Han, Ph.D.

Assistant Professor
Department of Medical Education
Southern Illinois University School of Medicine

hhan@siumed.edu