The *developmental pursuit* of foundational scientific knowledge

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VANDERBILT UNIVERSITY School of Medicine

Disclosures

- This presentation was prepared with financial support from the American Medical Association (AMA) as part of the Accelerating Change in Medical Education Initiative. Dr. Lomis serves as a principal investigator in that collaborative. The content presented reflects the views of VUSM and does not necessarily represent the views of AMA or other participants in this initiative.
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Objectives

This session will describe efforts at Vanderbilt University School of Medicine to integrate teaching and assessment of scientific foundations *throughout* medical school, focusing on our efforts during the post-clerkship phase.

By the end of the session, participants should be able to:

- Discuss ways in which the traditional 2+2 model might inhibit the development of habits for life-long learning
- Describe models that support integration of sciences into senior-level coursework (Integrated Science Courses, Master Adaptive Learner exercises)
- Describe the role of a programmatic approach to assessment, and developmental milestones, to reinforce desired outcomes

Traditional 2+2 model

Preloads scientific content; emphasis on delivery

Student perceptions

- Static body of knowledge to be assimilated
- Emphasis on memorization & regurgitation
- Disconnected from "real world"
- Viewed as a hurdle rather than a foundation

Faculty perceptions

- ✓ Students lack curiosity – study "for the test"
- ✓ Lament lack of opportunity to explore cutting edge
- ✓ Provide everything I know now, while I have them

Why change?

Call for Change

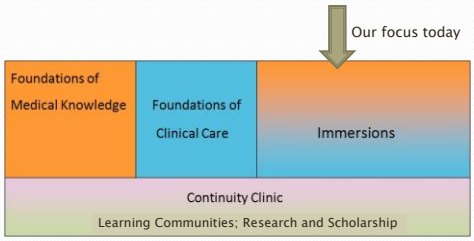
Irby et al, Educating Physicians, Carnegie Foundation 2010

- Individualization of pathways, yet standardization of outcomes
- Integration
- Inquiry/innovation/improvement
- Identity formation

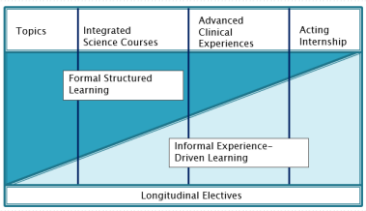
Vanderbilt Vision

- Integrate science throughout
- Deliver when learner is developmentally ready
- Emphasize need for continual learning
- Coach in skills of inquiry and habits of continually expanding one's knowledge base

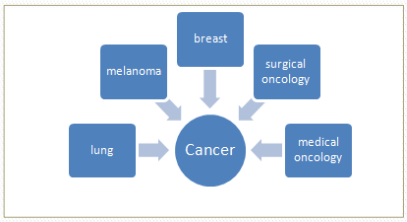
Overview of Vanderbilt C2.0



Menu of Immersion courses to address diverse competency needs of advanced students



Integrated Science Courses



Clinical and Molecular Based Approaches to Diagnosis and Treatment of Cancer

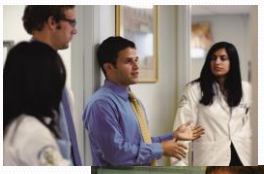
Course Schedule (Didactic sessions)

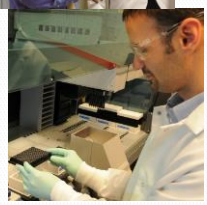
Day	Time	Topic
Monday	8:30 – 10:30 AM	Course Introduction
Wednesday	8:30 – 9:30 AM	CBL1 (Day 1)
Friday	Noon- 1 PM	C2T2/ITR Molecular Tumor Board: *"Novel EGFR rearrangements as a therapeutic target in lung cancer"*
	1:30 – 3:30 PM	TBL1: Precision medicine and oncogene addiction
Wednesday	8:30 – 10:30 AM	CBL1 (Day 2)
	11 AM - noon	CBL2 (Day 1)
Friday	1:30 – 3:30 PM	TBL2: Targeting oncogene addiction
Monday	11:30 AM – 12:45 PM	Burning Questions Presentation Group 1 (lunch provided)
Wednesday	8:30 – 10:30 AM	CBL2 (Day 2)
	11 AM - noon	CBL3 (Day 1)
Friday	Noon- 1 PM	Center for Cancer Targeted Therapies ViP Seminar: *"Progress and Challenges in the Treatment of Lung Cancer"*
	1:30 – 3:30 PM	TBL3: Tumor heterogeneity
Monday	11:30 AM – 12:45 PM	Burning Questions Presentation Group 2 (lunch provided)
Wednesday	8:30 – 10:30 AM	CBL3 (Day 2)
	11 AM - noon	Seminar: Preclinical drug discovery
Friday	1:30 -3 PM	Final exam

Co-taught by PhD researcher in cancer biology; MD/MBA surgical oncologist; MD/MSCI medical oncologist

Current ISCs

Critical Illness
Clinical and Molecular-based Approaches to Diagnosis and Treatment
Cardiovascular Diseases
Community Healthcare
Diabetes
Getting Hooked: Immersion in Addiction
Global Health: Delivering Primary Care in Resource-Limited Settings (Lwala and Latin America)
Immunity and Infections in the Immune-compromised Host
Injury, Repair, & Rehabilitation
Medical Imaging and Anatomy
The Skinny on Obesity: What Every Physician Should Know



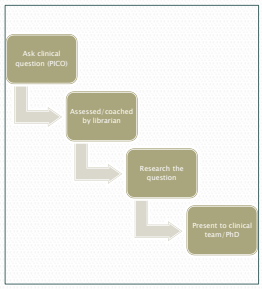


Advanced Clinical Experiences

Embed ongoing learning of foundational and advanced science content into daily work process

Coached process, involving basic science educators and librarians

Presentation of findings to team adds value to clinical system



Assessment *Drives* Learning

- Learners will invest energy in ways that produce reward *(as conveyed by our methods of evaluating their performance)*

  Friedlander, Armstrong, Aschenbrenner, Viggiano et al. Neurobiology of Learning. Acad Med. 2011;86:415-420

- Intentional assessment must thus be "fit for purpose"

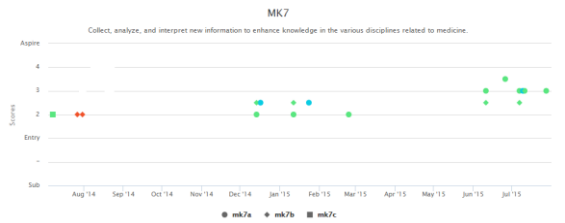
A programmatic approach with a deliberate and arranged set of longitudinal assessments is necessary to promote ***desired outcomes.***

Van der Vleuten & Schuwirth 2005

Programmatic assessment

Active and team-based learning activities permit the measurement of diverse competencies starting in year 1

Milestones provide meaningful data



MK7a	Unacceptable	Entry				Aspirational
Analysis	Does not demonstrate desire to expand knowledge base.	Superficial approach. Frequently confuses association and cause.	Sorts information to align with underlying principles.	Discriminates between competing hypotheses and understands how hypotheses might be strengthened or disproved.	Identifies and challenges one's own assumptions; looks beyond basic information provided.	Broadly inclusive analysis; challenges accepted hypotheses.

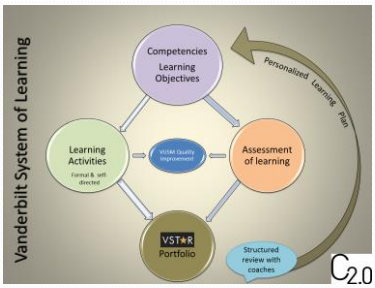
Rekindling curiosity

- High achievers may feel pressure to conceal weaknesses
- Concept of "psychological immune system":

  paralyzing tension between knowing they need feedback to improve and fearing information that disconfirms their practice

  Mann et al. Academic Medicine. 2011; 86:1120-1127
- Coaching promotes a culture of improvement

Vanderbilt System of Learning

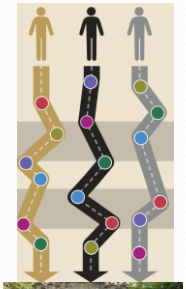


Change Process

- Establish trust between basic science & clinical faculty
- Basic science teachers work with clinicians to identify foundational vs more sophisticated content
- Clinicians acknowledge importance of scientific foundations that have become implicit in their work
- Generate excitement among basic science faculty to reconnect with more sophisticated senior learners
- Foster clinicians to more explicitly demonstrate their scholarly approach to care
- Integrate!

Systems approach

- Individualization to optimize learning
- Standardization of core expected outcomes



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C2.0

Questions?

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