

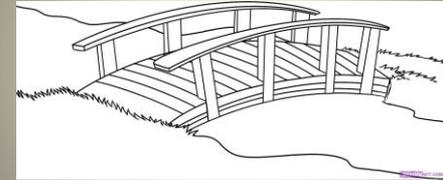
Medical Students and Basic Science

- Medicine continues to be a technical profession:
 - Designer drugs and therapeutic principles
 - Genetic expression and testing
 - Population-based research....
- Entering students must be conversant with fundamentals of chemistry, biology (and more...).
- Medical students are still undifferentiated apprentices on graduation day, and must be prepared to pursue any specialty.

...in even less time...

- Many schools (Duke, Vanderbilt, Baylor, Columbia, Penn, NYU) are truncating pre-clinical phase.
- Wake Forest Pre-Clinical Curriculum:
 - 56 weeks faculty-directed instruction + 8 more weeks of special evaluations and community practice experience
 - Last class in mid-February of 02 year
- Curricular efficiency is paramount (but so is efficacy).
- Faculty need to become a conduit to learning for a profession.

Give them what they need to know,
and show them how to use it.



Transductional Learning

- **Transduction:** *the process of converting one energy form to another, e.g., audio microphone or video camera to electronic (digital) medium, for storage or transmission.*
- Learned information must also be transformed, e.g. integrated into professional applications.
- But the process is not always intuitive for learners
- **....or for inexperienced instructors.**
- Article in *Forbes*: "Frank H. Netter, MD School Of Medicine: Developing a new breed of medical school faculty to change the way we educate doctors."

Meeting at the Middle

What do physicians do?
What do they need to know to do it?



How does the body function?
How does malfunction happen?
Where can malfunction be corrected?

DR. E'S TEACHER HELP COLUMN

Dear Dr. E:

So, OK. I get it. We need to mix some clinical relevance in with our science learning. But science is what I do. I'm in the lab all the time: white mice, micropipettes, gels, data, grants, pubs..... I am not a physician....I don't see patients....I don't have insights about healthcare....they don't want to listen to me, anyway. How can I build a bridge to something when I don't know where it's supposed to go?"

Still Bewildered Ph.D.

Gotta bring the other side into focus.



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DR. E'S TEACHER HELP COLUMN

Dear Still:

So we start by demonstrating repeated examples of using critical knowledge in patient care.

Medical students feel a calling to provide health care, but they don't yet know what they need to know to do the job. This is why we're here -- to help them learn stuff *and* how to use it.

Medical students are skilled and ambitious learners. They will quickly embrace information they need for the job.

Dr. E.

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Some Strategies

1. Case-Centered Tutorial Sessions
2. Review Sessions With Clinical Application
3. Case Examples Inside Lectures
4. Clinical Pearls Inside Lectures
5. Patient Care-Oriented Exam Questions
6. Case-Centered Practical Exams

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1. Case-Centered Tutorials

- “*Case-Centered Learning*”: a discrete course at WFU
- Weekly case in 01 Year -- 2 sessions, 2 hr each
- Small groups, faculty facilitated.
- Complete case: presentation through outcome
- Learning driven by clinical reasoning
- Self-directed / independent / facilitated learning
- Students practice application of learning to a context

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1. Case-Centered Tutorials

- Course covers multiple cases and problems
- Multiple issues in each case
- Small-group model allows assessment of individual performance
- Cases need to be carefully scripted
- Potential for quality control issues
- WFU uses committee of ≈ 15 faculty for entire 1-year program

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2. Case-Centered Review

- Discrete activity following lecture(s) or an assigned independent study. Usually in lecture hall.
- Scientist lecturers and clinicians team up to coordinate presentations and tie learning together.
- Multiple related vignettes and situations
- Various pre-clinical topics that build on knowledge:
 - Choosing pharma therapy
 - Clinical lab testing and results
 - Anatomy of surgical procedures

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3. Cases Inside Lectures

- Start a lecture with case scenario (problem).
- Move immediately past the case with direct presentation of basic content.
- Return to scenario at end, pulling information out of lecture, to resolve case.
- Vignettes should be carefully scripted with clinician partners.
- Take-home scenarios also work (Team Learning).



4. Clinical Pearls Inside Lectures

- Insert brief clinical “uses” in the course of a directed content presentation.
- Typically not fully developed clinical scenarios
- Useful in all areas of basic science:
 - Cholesterol synthesis → action of statins
 - Hepatic detoxification → how drugs are orally active
 - Protein glycosylation → why measures of hemoglobin A1c are valid in management of diabetes.
 - Cranial nerves → manifestations of Bell’s palsy of CN VII



5. Exams: USMLE Step 1 Design

- Testing does affect learning.
- Despite impression that Step 1 certifies competency of basic knowledge and concepts,
- The stem of every item (question) is a clinical (plausible research) vignette (problem).
- Comprehension of the stem information is essential to choosing correct diagnostic / therapeutic decision.
- An expert can recite a correct answer from the stem without seeing any choices.



5. USMLE Step 1 Design

- Every item stem is followed by a profession-related lead-in, e.g.
 - Which of the following is abnormal?
 - Which of the following is the most likely cause?
 - Which of the following should be administered?
 - Which of the following is defective / deficient / nonfunctioning?
- Most valued content knowledge from the pre-clinical phase is that which is used in clinical practice.



5. Case-Oriented Exam Questions

- Keep it simple (easy reading)
- Keep it focused on a single problem
- Make choice a decision: diagnosis, therapy, mechanism
- Correct choice requires comprehension or knowledge of basic information
- Response selections should be feasible.
- Avoid repeating the instructor’s exact presentation.
- Use a committee to edit items.



6. Case-Oriented Practical Exam

- “Standardized Patient Assessment”
- Real simulated patient or scenario on paper
- Problem-solving by interview and PE
- Live oral exam with faculty
- Analysis of clinical reasoning, learning, and use of appropriate resources
- Comprehension and correct application of newly acquired information.



Summary



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Final Points

- Professional knowledge is applied information (use more than recall). Let need drive learning.
- Technical knowledge is still crucial, but...
- Transduction of learning → using is an acquired skill.
- Select examples with most clinical relevance:
 - Insulin versus prolactin
- Talk as a scientist who knows why info is relevant.
- Make friends with interested clinicians
 - Get involved with case writing, exams, etc.

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Thank You!

Acknowledgement to
Professor Jack W. Strandhoy

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QUESTIONS?

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