Learning with Socrates
Transforming Education at the
University of Missouri, Kansas City
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Professor
Family and Community Medicine
University of Missouri

Can Today’s Medical Educators Teach for a World They Cannot Imagine?
The World is Changing
The science knowledge given to today’s student has an estimated half life of 4-6 years.

The knowledge explosion and the advances in science and technology

Scientists of tomorrow must learn to learn because the knowledge is changing and expanding so rapidly

We must teach students who will live in a world the teachers cannot imagine

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Scientists from the RAND Corporation have created this model to illustrate how a “frame computer” could look like in the year 2000. However, the needed technology will not be economically feasible for the average home. Also, the scientists readily admit that the computer will require yet uncreated technology to actually work. In years from now scientific progress is expected to solve these problems. With teletype interface and the Fortran language, the computer will be easy to use.

1960 Desktop
The computer communicates, searches, stores retrieves and opens the world

The challenge:

• The challenge to medical schools is to prepare physicians who will practice in a world that today’s faculty cannot imagine

• The medical school graduates are never a finished product, they must be lifelong learners

• Practicing medicine is the application of the most current knowledge to solve problems

• Practicing medicine is fun so learning to practice medicine should be fun

• Use what we learn. Just in time learning.
The medical school curriculum of the past

- Basic science and Clinical practice
- Lecture 40+ hrs/wk
- Large classes
- Emphasize memorization
- Learned from professors and books

How many times did you learn the Krebs cycle?

The lecture

- One way communication from the pulpit to the students
- Commonly 50 minutes long—30 minutes longer than the attention span
- Lecturer summarizes from several sources
- 1000 lectures one time or one lecture 1000 times
- Limited metacognition
- Lecturer decides what is important to the learners
- Deliver large amounts of superficial information to a large number of people
**A Bucket Curriculum**

- Anatomy
- Biochemistry
- Physiology
- Microbiology
- Behavioral Science
- Pharmacology

**Evaluation**

- Memorization of facts
- Limited evaluation of reasoning
- Evaluation is not feedback to the faculty for improvement of the curriculum
- No feedback to the faculty to improve teaching skills

Do we evaluate what we value?
Constructivist Learning Theory and PBL

We think about our knowledge and our experiences and construct our own understanding.
We generate our own rules and mental models to make sense of our world.

- Search for meaning
- Understand whole and parts
- Purpose of learning is to construct individual understanding rather than memorize or accept the teacher’s interpretation
- Curriculum emphasizes problem solving
- Evaluation is integrated into learning replaces exams

Learning by Professionals

- Visual learners
- Experiential learners
- Collaborative learners
- Just in time learners vs Just in case learners
- Learn by stories
- Groupthink is being overused. Team work is stimulating, useful exchange of ideas, social skills (PBL)
- Some of the best thinking comes from private thinking and metanalysis
- PBL is not a panacea, but it is another tool for learning
Learn patient care instead of learning about patient care.

1989
“The University of Missouri has a perfectly preserved 1960s curriculum”
An integrated curriculum: Problem-based Learning
Inquiry-based Curriculum

- No department or discipline-based courses
- Emphasis on problem solving
- 60% decrease in lecture time
- Students can learn without being taught
- Informatics skills, computer is an external brain
- Small group learning
- Competency-based curriculum
- Lifelong learning skills
- Hybrid curriculum of lectures, self-directed learning, groupthink, reflection and analysis

The University of Missouri-Columbia
Curriculum:

<table>
<thead>
<tr>
<th>Year One</th>
<th>Year Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four 10-week blocks:</td>
<td>Four 10-week blocks:</td>
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<tr>
<td>8 weeks for learning</td>
<td>8 weeks for learning</td>
</tr>
<tr>
<td>1 week for evaluation</td>
<td>1 week for evaluation</td>
</tr>
<tr>
<td>1 week for a break</td>
<td>1 week for a break</td>
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</table>
First year

The integrated curriculum

<table>
<thead>
<tr>
<th>Block 1</th>
<th>Block 2</th>
<th>Block 3</th>
<th>Block 4</th>
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</thead>
<tbody>
<tr>
<td>Basic Sci/PBL</td>
<td>Basic Sci/PBL</td>
<td>Basic Sci/PBL</td>
<td>Basic Sci/PBL</td>
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<tr>
<td>Biochemistry</td>
<td>Metabolism</td>
<td>Endocrine</td>
<td>Micro-organisms</td>
</tr>
<tr>
<td>Anatomy</td>
<td>Pulmonary</td>
<td>Neuroscience</td>
<td>Immune response</td>
</tr>
<tr>
<td>Genetics</td>
<td>Cardiovascular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immunology</td>
<td>Gastrointestinal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molecular biology</td>
<td>Renal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Histology</td>
<td>Respiratory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embryology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intro to Pt Care</td>
<td>Intro to Pt Care</td>
<td>Intro to Pt Care</td>
<td>Intro to Pt Care</td>
</tr>
<tr>
<td>History taking</td>
<td>Physical Exam</td>
<td>Psychosocial</td>
<td>Epidemiology</td>
</tr>
<tr>
<td>Dr. Patient</td>
<td></td>
<td>Aspects of Med</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>One-half day with a physician</td>
</tr>
</tbody>
</table>

Second year

The integrated curriculum

<table>
<thead>
<tr>
<th>Block 5</th>
<th>Block 6</th>
<th>Block 7</th>
<th>Block 8</th>
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</thead>
<tbody>
<tr>
<td>Intro to Pt Care</td>
<td>Intro to Pt Care</td>
<td>Intro to Pt Care</td>
<td>Intro to Pt Care</td>
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<tr>
<td>Diagnostic tests</td>
<td>Psychopathology</td>
<td>Prep for Clinical</td>
<td>Current Topics</td>
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<td>Selection and interpretation</td>
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<td>Clerkships</td>
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<tr>
<td>Basic Sci/PBL</td>
<td>Basic Sci/PBL</td>
<td>Basic Sci/PBL</td>
<td>Basic Sci/PBL</td>
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<td>Cell injury</td>
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<td>Gastrointestinal</td>
<td>Infectious diseases</td>
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<tr>
<td>Hemodynamics</td>
<td>Pulmonary</td>
<td>Liver</td>
<td>Musculoskeletal</td>
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<tr>
<td>Genetic disorders</td>
<td>Blood disorders</td>
<td>Endocrine</td>
<td>Nervous system</td>
</tr>
<tr>
<td>Autoimmunity</td>
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<td>Renal</td>
<td></td>
</tr>
<tr>
<td>Immune deficiency</td>
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<td>Genitourinary</td>
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</tr>
<tr>
<td>APD</td>
<td>APD</td>
<td>APD</td>
<td>APD</td>
</tr>
<tr>
<td>Year 1</td>
<td>Typical Week</td>
<td>Mon</td>
<td>Tues</td>
</tr>
<tr>
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<tr>
<td>PBL</td>
<td>Lecture</td>
<td>PBL</td>
<td>Lecture</td>
</tr>
<tr>
<td>Intro Pt Care</td>
<td>Study</td>
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<td>Intro Pt Care</td>
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<tr>
<td>ACE</td>
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</table>

<table>
<thead>
<tr>
<th>Year 2</th>
<th>Typical Week</th>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
<th>Thurs</th>
<th>Fri</th>
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<tbody>
<tr>
<td>Intro Pt Care</td>
<td>Study</td>
<td>Intro Pt Care</td>
<td>Study</td>
<td>Study</td>
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</tr>
<tr>
<td>Lecture</td>
<td>PBL</td>
<td>Lecture</td>
<td>PBL</td>
<td>Lecture</td>
<td></td>
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</tbody>
</table>

**Clinical Curriculum**

**Year 3**
Core Clerkships
- Internal Medicine 8 wks
- Pediatrics 8 wks
- Family Medicine 8 wks
- Surgery 8 wks
- Psychiatry 6 wks
- Neurology 2 wks
- Obstetrics/Gynecology 8 wks

**Year 4**
- 3 Advanced Clinical Selectives (4 weeks each)
- 1 Advanced Biomedical Sciences (4 weeks)
- 4 General Electives (4 weeks each)
Strategic use of lectures for basic concepts

Problem-based learning groups
Small Group Discussion

- Communication
- New ideas and get feedback
- Working/problem solving group
- Members bring knowledge and experiences
- Self-directed learning, collaborative learning
- Interpersonal skills
Problem-based Learning Design

Session 1
Presentation of the case (HPI) with minimal information
Students analyze the presentation, identify key points
Begin to develop learning issues needed to progress with the case
Develop a DDx/hypotheses. More information
Assign learning issues to be researched and presented to the group

Session X
Presentation of learning issues
Further discussion of the case, DDx +/-
Receive next parts of the case (request and justify)
Discussion of new information
Working Dx and management plan
Develop and assign learning issues

Problem-based Learning Design

Session XY
Presentation of learning issues from Session XY
Further discussion of the working Dx and management plan
Discussion of any new information
Agreement on conclusions
Wrap-up
Inquiry-based Learning

Life is problem solving. Medicine is problem solving
Simulation for actual patient care.
Cases are real with enrichment built into the curriculum
Doctors learn through stories—cases
Inquiry-based learning is student-centered not faculty-centered
Life-long learning and self-directed learning
Inquiry-based learning is consistent with current learning theory
Students learn medicine rather than learning about medicine
Small group learning is resource intensive but can be modified

Future—students will access the patient record and come to larger groups ready to discuss
Use of twitter and social networking
Teleconferencing with offsite consultants

Change: New roles for faculty and students

Disciplines identify most important ideas to be learned by future physicians
Multi-discipline faculty groups identify most important concepts
Develop a concept map by organ system

- Cardiovascular
  - Structure
  - Electrophysiology
  - Embryology
  - Histology
  - Pathology
  - AV/SA
  - Purkinje
  - QRS

- Renal
- Respiratory
- Neurology
Learning Strategies

Electrophysiology of the Heart

Lecture  Lab  PBL Case  Self-directed

Evaluation

Small group  Knowledge Exam  Lab Exam  Problem Solving

Curriculum
Put Puzzle Pieces Together

Assign Talent

Best Lecturers  Case Developers  Lab Design  Small Groups
Planning Groups  Evaluation Team  Mission Control
The Future of UMKC Medicine
Will the LCME dictate change?
Do you have to do problem-based learning?
Does it have to replicate UMC?
Is change possible with limited resources?

Questions for the UMKC faculty?

Are the faculty willing to change?
Are there variations to inquiry learning that are less resource intensive?
Yes!
Is inquiry learning all or nothing?
No!
What are the resource requirements?
Must have
Faculty willing to change
Like to have
Interdisciplinary teams including clinicians
Keep on dreaming
A huge grant