Medical Education Journal Club

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### Disclosure Information

**Activity Directors / Planners / Reviewers / Faculty**

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Disclosure / Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fauzia Nausheen, MD</td>
<td>Speaker</td>
<td>Reports no relevant financial relationships.</td>
</tr>
<tr>
<td>Tracey Weiler, PhD</td>
<td>Speaker</td>
<td>Reports no relevant financial relationships.</td>
</tr>
</tbody>
</table>
Learning Objectives

- Be able to list the search results for one medical education database consulted in the design of a course or teaching session.

- Conduct a critical appraisal of an article in the medical education research.

- Identify the applicability of research results to one's own course or teaching session.
Medical Education Journal Club

- Establish a forum for faculty to share and discuss recent literature in medical education
- Use best evidence in medical education literature to evaluate and advance current practices in our educational program
- Establish a culture that promotes curricular innovation and change in an evidence-based manner
- Stimulate educational scholarship
Cognition Before Curriculum: Rethinking the Integration of Basic Science and Clinical Learning

Kulamakan Mahan Kulasegaram, Maria Athina Martimianakis, PhD, Maria Mylopoulos, PhD, Cynthia R. Whitehead, MD, PhD, and Nicole N. Woods, PhD

Academic Medicine, Vol. 88, No. 10 / October 2013

http://www.polleverywhere.com/tweiler

Tracey Weiler
Fauzia Naushdeen
Learning Outcomes for Today

• Describe continuum of program, course and session level integration
• Summarize techniques and approaches for integration at the level of program / course / session
• Apply integration framework to the FIU HWCOM curriculum
• Propose a mechanism for integrative assessment and writing of exam questions
Goal: Integration

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Limited science in the curriculum</td>
<td>• Integrate advances in the laboratory with practice at the bedside</td>
</tr>
<tr>
<td>• No connection between practice and science</td>
<td>• Provide clinical training in university teaching hospitals</td>
</tr>
</tbody>
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## Goal: Integration

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<th>Recommendation</th>
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<tr>
<td><strong>Poor connections</strong> between formal knowledge and experiential learning</td>
<td><strong>Connect formal knowledge to clinical experience</strong>, including early clinical immersion and adequate opportunities for more advanced learners to reflect and study.</td>
</tr>
<tr>
<td><strong>Fragmented understanding</strong> of patient experience</td>
<td><strong>Integrate basic, clinical and social sciences</strong></td>
</tr>
<tr>
<td>Poor understanding of <strong>non-clinical and civic roles</strong> of physicians</td>
<td><strong>Engage learners at all levels with a more comprehensive perspective on patients’ experience of illness and care, including more longitudinal connections with patients.</strong></td>
</tr>
<tr>
<td>Inadequate attention to the skills required for <strong>effective team-delivered care</strong> in a complex health care system</td>
<td><strong>Provide opportunities for learners to experience the broader professional roles of physicians, including educator, advocate, investigator</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Incorporate inter-professional education and teamwork</strong> into the curriculum</td>
</tr>
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</table>
What is Integration?

• Definition - Wikipedia
  – Connecting skills and knowledge from multiple sources and experiences
  – Applying skills and practices in various settings
  – Utilizing diverse and even contradictory points of view

Is it a Goal? Is it a Strategy?
• “Deliberate unification of separate areas of knowledge”

• Goal or strategy?
  – “often no clear distinction is made between the aims and objectives of education provision and the strategies adopted for their achievement; educational concepts may become ends in themselves, and the overall aim becomes lost”  Spenser & Jordan 1999

• Needed an organizational framework for the operational concept of integration
Organizing Framework

**Program Level**
- Mission of school
- Goals of program
- Measurable objectives
- Educational requirements

**Course Level**
- Learner analysis
- Course objectives
- Content
- Sequencing
- Assessment

**Session Level**
- Session objectives
- Content
- Sequencing
- Teaching strategies

**Curriculum Development Decisions**
- Purpose[s] of integration
- Forms: Elements to be integrated (e.g., content, skills, both)
- Dimensions: Boundaries of integration (e.g., medicine, nursing, health sciences, semesters, years)
- Environments: Teaching environments in which integration will occur (e.g., classroom, clinic, simulation, lab)
- Coherence: Underlying principles of integration (e.g., organ systems, symptoms, human development)

**Integration Decisions**
- Type of integration to achieve course objectives: Which level on the integration continuum (see Table 2)
- Implications for faculty, space, technology
- Implications for scheduling

**Session Decisions**
- Preparation: Preparatory work required
- Linking: Means of connecting to previous learning
- Engagement: Means of engaging students
- Transfer: Opportunities for students to integrate their learning and link to next session
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METHODS

• Relevant literature related to integration
  – 30 yrs (1982-2012)
  – Biomedical science (medical) and clinical science
  – papers that aimed to improve learning outcomes or skills

• Papers organized as per Integration Framework (Goldman and Schroth)
  – Programs (superstructure)
  – Courses (focused on specific unit of knowledge)
  – Teaching Sessions

• Articles evaluated for each of three characteristics
  – Method /approach for integration
  – Support for methods
  – Evidence for success of integration
RESULTS

Program Level
- Mission of school
- Goals of program
- Measurable objectives
- Educational requirements

Course Level
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# Program Level Integration Strategy

<table>
<thead>
<tr>
<th>Considerations (framing question)</th>
<th>Decisions required</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose(s) (Why?)</td>
<td>What is the integration trying to achieve?</td>
<td>• Help students deal with complex problems</td>
</tr>
<tr>
<td>Forms (What?)</td>
<td>Which elements are to be integrated?</td>
<td>• Enhance functional competency</td>
</tr>
<tr>
<td>Dimensions (When?)</td>
<td>What are the boundaries of the integration activity?</td>
<td>• Foster higher-order thinking</td>
</tr>
<tr>
<td>Environments (Where?)</td>
<td>In what teaching environments should integration take place?</td>
<td>• Content knowledge</td>
</tr>
<tr>
<td>Coherence (How?)</td>
<td>What underlying principle or principles unify the integration activity and provide it with integrity?</td>
<td>• Skill development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Horizontal integration (semester or year)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Vertical integration (multiple years)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Both horizontal and vertical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Interprofessional</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Classroom</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Simulation center</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Clinic/bedside</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Organ systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Stages of human development</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Disease or symptom</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Competencies</td>
</tr>
</tbody>
</table>

# Program Level Results

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Back to Basic Sciences Clerkship Model</strong></td>
</tr>
<tr>
<td>Basic Science to guide learning of clinical concepts</td>
</tr>
<tr>
<td><em>students thought the basic sciences more relevant through this approach</em></td>
</tr>
<tr>
<td>Increase proximity of basic and clinical teaching</td>
</tr>
<tr>
<td><em>Invite basic scientist in clinical settings and clinical faculty early in the curriculum</em></td>
</tr>
<tr>
<td><em>Best practices in redeploying the teaching personnel are unclear</em></td>
</tr>
<tr>
<td>PBL (traditional or hybrid)</td>
</tr>
<tr>
<td><em>Depends on content, setting and tutors</em></td>
</tr>
</tbody>
</table>

Program Level Results

1. Poor transfer of content from one context to other
2. Students training to form advance schema for clinical reasoning may not appreciate relevance of basic science
3. Review of basic science is an extra cognitive load with extensive demands of clinical learning
4. More useful to have experiential learning in the early years of training
5. Teacher-led integrated curriculum around specific organ systems outperformed the PBL and traditional teaching
Program Integration @ FIU

Results

http://www.polleverywhere.com/tweiler
# Program Integration @ FIU

**patient-centered curriculum, cultural competence**

<table>
<thead>
<tr>
<th>Model</th>
<th>FIU</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back to Basic Sciences Clerkship Model</td>
<td>Neuro clerkship</td>
<td>Neuroanatomical review in TBL</td>
</tr>
<tr>
<td>Basic Science to guide learning of Clinical concepts</td>
<td>Clinical skill 2\textsuperscript{nd} year</td>
<td>Integrative Case based learning, and clinical skills</td>
</tr>
<tr>
<td>Increase proximity of Basic and Clinical teaching</td>
<td>Neighborhood HELP program</td>
<td>Integrative clinical skills and N-help</td>
</tr>
<tr>
<td>PBL (traditional or hybrid)</td>
<td>Osler Friday</td>
<td>Integrated Clerkship PBL</td>
</tr>
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</table>

> Success of three touch system ?
Course Level Integration Strategy

Course Level Integration
Harden’s ‘Integration Ladder’

“What type of integration is needed to achieve the course objectives?”

## Course Level Results

<table>
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<tr>
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</tr>
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<tbody>
<tr>
<td><strong>Contextualization of basic science concepts</strong></td>
<td>• Clinical realm with applied basic science concepts&lt;br&gt;• Clinical problem becomes demonstration of a concept in action&lt;br&gt;  • Goal can be misdirected&lt;br&gt;  • Conceptual errors&lt;br&gt;  • Require further refinement</td>
</tr>
<tr>
<td><strong>Shared teaching</strong></td>
<td>Requires:&lt;br&gt;  • Synergy of teachers&lt;br&gt;  • Depth of content&lt;br&gt;  • Quality of exchange between basic scientist and clinicians&lt;br&gt;  • Can result in mini 2+2 curriculum</td>
</tr>
</tbody>
</table>

- Actual knowledge gain and learning outcomes?
Course Integration @ FIU

Results

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# Course Integration @ FIU

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<th>FIU</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contextualization of basic science concepts</strong></td>
<td>• TBL, CBL (small groups and large groups)</td>
<td>Does knowledge learned in one context apply to another?</td>
</tr>
<tr>
<td>in clinical teaching</td>
<td>• Application exercises</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Core cases</td>
<td></td>
</tr>
<tr>
<td><strong>Shared teaching</strong></td>
<td>• Basic science and Clinical science (synergy, depth of knowledge, quality of exchange)</td>
<td>• Linking knowledge</td>
</tr>
<tr>
<td>• Simultaneous?</td>
<td></td>
<td>• 2+2 miniature ??</td>
</tr>
<tr>
<td>• Sequential?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Session Level Integration Strategy

<table>
<thead>
<tr>
<th>Session component</th>
<th>Purpose</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Preparation       | - Give the learner needed background information  
                   - Set expectations for what is to come | - Assign readings, questions, or problems in advance  
                   - Describe clearly how session will run |
| Linking           | - Stimulate the brain: Connect to what the learner already knows and/or has experienced | - Reference/recall specifics from prior session and/or other coursework  
                   - Query about recent experiences |
| Engagement        | - Excite: Hook the learner by showing the relevance  
                   - Present material and learning guidance  
                   - Engage: Have the learner use the material to integrate it with prior knowledge and experience  
                   - Foster awareness: Help the learner realize what he or she has gained | - Use alarming statistics, a story of a patient, etc., as a hook  
                   - Present a case, problem, project, etc., and the thought/action desired  
                   - Assign individuals, pairs, or small groups to solve a problem, develop a plan, formulate a response, etc.  
                   - Provide opportunity for reflection and discussion; feedback |
| Transfer          | - Enhance retention of new learning | - Provide cues and strategies for future retrieval  
                   - Describe next session |

# Session Level Results

<table>
<thead>
<tr>
<th>Model</th>
<th>Comment</th>
<th>Success?</th>
</tr>
</thead>
</table>
| 1. Basic and clinical sciences in a causal network                    | • Causal story ↑ ability to diagnose new cases  
• Integrated explanations rather than evidence-based clinical algorithms to diagnose and retain information | YES                              |
|                                                                       | • Randomized control trials  
• Simulations of educational interventions                                      |                                  |
| 2. Encapsulation Theory                                                | Expertise is a process that enfolds knowledge into meaningful categories and develops illness scripts | YES                              |
|                                                                       | • Some evidence from small studies with experts                                                                                  |                                  |
Session Integration at FIU

Results

http://www.polleverywhere.com/tweiler
# Session Integration @ FIU

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<tr>
<th>Model</th>
<th>FIU</th>
</tr>
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<tbody>
<tr>
<td>1. Basic and clinical sciences in a causal network</td>
<td>• Pharmacology, biochemistry, physiology and genetics</td>
</tr>
<tr>
<td></td>
<td>• Effect of drug is due to interaction with target which causes decrease in ...</td>
</tr>
<tr>
<td></td>
<td>• Physiology, biochemistry, genetics</td>
</tr>
<tr>
<td></td>
<td>• Genetic defect inactivates protein which increases concentration of ions which ...</td>
</tr>
<tr>
<td>2. Encapsulation Theory</td>
<td>• Second year CBL cases</td>
</tr>
<tr>
<td></td>
<td>• Third year Osler Friday PBL cases</td>
</tr>
</tbody>
</table>
## FIU Session Integration

<table>
<thead>
<tr>
<th>Component</th>
<th>FIU</th>
</tr>
</thead>
</table>
| Preparation | • Provide readings  
• Learning Objectives |
| Linking | • “What do you know about X?”  
• “Remember when Dr. Who mentioned Y?”  
• “I talked about Z last week... What did I say?” |
| Engagement | • Show relevance with clinical perspective  
• Application exercises where students do something with their new knowledge  
• PBL/TBL where students need to figure out what they know and don’t know and where to find the answers |
| Transfer | • Apply new knowledge through clicker questions  
• Physiology – apply principles to clinical case; create a question for further study; |
Study Conclusion

• Critical Narrative Review with some anecdotal evidence
• Evaluation of successful integration using learning outcomes is scarce
• Many papers have integration described as goal rather than a process
• Integration needs to have a purpose
  – What are you trying to achieve in the learner?
Discussion

• Planner vs. Learner
  – Integration must happen for the learner, not just the teacher
  – Integration @ top levels of Bloom’s taxonomy
    • Synthesis
    • Evaluation

• Systematic approach to integration
  – Program/Course/Session
  – Infrastructure/Faculty/Time Resources

• Program Level: Success of three touch system?
• Course Level: Actual knowledge gain & learning outcomes?
• Role of integrative assessment and writing of exam questions?
Learning Outcomes for Today

• Describe continuum of program, course and session level integration
• Summarize techniques and approaches for integration at the level of program / course / session
• Apply integration framework to the FIU HWCOM curriculum
• Propose a mechanism for integrative assessment and writing of exam questions
Acknowledgements

Office of Medical Education
  – Carla Lupi
  – Chris Castro

Thank You!
Course Level Integration options

- Focus on whole field with real problems to get student-initiated integration
- ≥ 2disciplines are combined; no individual subject area is identifiable
- Many subject areas in a single theme, problem, or issues-based course
- Integrated courses & subject courses with temporal coordination
- An area of common interest to multiple subjects is introduced
- Complementary disciplines jointly plan and deliver content
- Timing of related subjects aligned across independent courses
- Content/skills infused into existing subject course; “clin.corr.”
- Isolation, but faculty consult with others to avoid overlap
- Isolation, but faculty know content taught by others
- Independent teaching by subject matter experts