

# INTERNATIONAL ASSOCIATION OF MEDICAL SCIENCE EDUCATORS

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Leiden University Medical Center  
Leiden THE NETHERLANDS

## ASSOCIATION MANAGER

**Julie K. Hewett, CMP**  
Huntington WV USA

## WEBSITE

[www.iamse.org](http://www.iamse.org)

Dear IAMSE Colleagues,

On behalf of the 2011 Program Planning Committee, it is with great pleasure that I welcome you to the 15<sup>th</sup> annual meeting of the International Association of Medical Science Educators. We have endeavored over the last 15 months to plan a meeting for you that highlights a number of critical themes in health professions education. The foundational premise with which the committee initiated planning was that, regardless of our schools, disciplines or health professions, we all begin educating students as medical **professionals** from the moment they walk through our doors and into our classrooms. While educating students in the foundational sciences is crucial in the development of critical thinking skills and ultimately quality patient care, we must also acknowledge the importance of things like professionalism, leadership, teamwork and humanism in the process of creating medical professionals. Traditionally we have often thought about the latter as skills developed during more purely clinical training. Perhaps our minds have been opened by the relatively recent advances in the integration of basic and clinical science education or perhaps we have just allowed ourselves to begin thinking beyond our own disciplines and classrooms. In any case, we have begun to appreciate that our students begin their journey to become professionals from the moment they enter our programs. Although our focus may be on the importance of basic science in this educational process, we can simultaneously guide students toward development of the skills and attitudes that will make them the kind of doctors, veterinarians, nurses, podiatrists, dentists, pharmacists, physician's assistants, *etc.* that we want to graduate. We hope that the sub-themes of our meeting, highlighted by our plenary speakers, workshops, focus sessions, posters and eDemos will blend together seamlessly to provide for all of us opportunities to think about how we can help our students become complete medical professionals, regardless of when and how we have the privilege to interact with them.

If this is your first IAMSE meeting, get ready to learn, to meet new friends and to return to your home institutions exhausted and full of ideas and new enthusiasm! If you have joined us previously, we welcome you back and thank you for your contributions to what is the collective wisdom, experience and hospitality that makes us IAMSE.

Finally, this meeting was made possible by the tireless efforts of the 2011 Program Planning Committee and to them I owe a tremendous debt of gratitude. This is without question the most creative and hardworking group of international, interdisciplinary educators with which I have ever had the privilege to work. Thank-you to Greg, India, Dale, Bill, Ed, Lon, Bulent, Carlos, David, Ida, Susan, Peter, Nehad and Julie.

Warmest regards for an enjoyable meeting,

Amy L. Wilson-Delfosse, Ph.D.  
Chair, 2011 Program Planning Committee

*...supporting professional excellence*

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## PLENARY SPEAKER LISTING

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**“Science Education in a Medical Curriculum: Teaching Science or Training Scientists?”**

*Friedo Dekker, Leiden University Medical Center, Leiden THE NETHERLANDS*

**“Scientific Foundations for Future Physicians”**

*William Galey, Howard Hughes Medical Institute, Chevy Chase MD, USA*

**“Developing Relationships and Professional Behavior in a Basic Sciences Curriculum”**

*Aviad Haramati, Georgetown University School of Medicine, Washington DC, USA*

**“Use of Simulation to Assess Competencies and Improve Healthcare”**

*William C. McGaghie, Northwestern University Feinberg School of Medicine,  
Chicago IL, USA*

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## PROGRAM COMMITTEE LISTING

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**Amy Wilson-Delfosse, Program Chair**

Case Western Reserve University  
Cleveland OH, USA

**Carlos Isada**

Cleveland Clinic  
Cleveland OH, USA

**Ed Klatt**

Mercer University  
Savannah GA, USA

**Dale Quest**

Texas Tech University Health Science Center  
El Paso TX, USA

**Greg Smith**

St. Louis University  
St. Louis MO, USA

**David Franklin**

Tulane University  
New Orleans LA, USA

**Bill Jeffries**

University of Vermont  
Burlington VT, USA

**India Lane**

University of Tennessee  
Knoxville TN, USA

**Ida Ryland**

Edge Hill University  
Ormskirk Lancs, UK

**Lon Van Winkle**

Midwestern University  
Downers Grove IL, USA

**Peter de Jong 2011 Review Committee Chair**

Leiden University Medical Center  
Leiden, THE NETHERLANDS

**Susan Pasquale, 2010 Program Chair**

University of Massachusetts  
Worcester MA, USA

**Nehad El Sawi, 2012 Program Chair**

Central Michigan College of Medicine  
Mount Pleasant MI, USA

## **PAST PROGRAM CHAIRS**

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**Susan Pasquale** – 2010 Program Chair

**Peter de Jong** – 2009 Program Chair

**Veronica Michaelsen** – 2008 Program Chair

**Frazier Stevenson** – 2007 Program Chair

**John Szarek** – 2006 Program Chair

**Nehad El-Sawi** – 2005 Program Chair

**Thomas Schmidt** – 2004 Program Chair

**Gary Rosenfeld** - 2003 Program Chair

**E. Pat Finnerty** – 2002 Program Chair

**Giulia Bonaminio** – 2000 Program Chair

**Henry Mandin** – 1999 Program Chair



## REVIEW COMMITTEE LISTING

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**Peter de Jong, Review Committee Chair**

Leiden University Medical Center  
Leiden, THE NETHERLANDS

**Deborah Barr**

New York Chiropractic College  
Seneca Falls NY, USA

**Pat Finnerty**

Des Moines University  
Des Moines IA, USA

**Paul Kirk**

Cardiff University  
Cardiff, UNITED KINGDOM

**Rakesh Kumar**

University of New South Wales  
Sydney, AUSTRALIA

**Linda May**

Western University of Health Sciences  
Pomona CA, USA

**Mary Metcalf**

Clinical Tools, Inc.  
Chapel Hill NC, USA

**Dale Quest**

Texas Tech University Health Science Center  
El Paso TX, USA

**Christine Seibert**

University of Wisconsin  
Madison WI, USA

**Dave Wiegman**

University of Louisville  
Louisville KY, USA

**Robert Augustyniak**

Oakland University  
Rochester MI, USA

**James Brokaw**

Indiana University  
Indianapolis IN, USA

**Mary Furlong**

Georgetown University  
Washington DC, USA

**Ed Klatt**

Mercer University  
Savannah GA, USA

**Ann Lambros**

Wake Forest University  
Winston-Salem NC, USA

**Dani McBeth**

Sophie Davis School of Biomedical Education  
New York NY, USA

**Luke Mortensen**

Des Moines University  
Des Moines IA, USA

**Amina Sadik**

Touro University Nevada  
Henderson NV, USA

**Julie Tebo**

Cleveland Clinic  
Cleveland OH, USA

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## MEETING SPONSORS & EXHIBITORS

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## DAILY PROGRAM SCHEDULE

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Saturday, June 18, 2011

8:00 - 4:30p     **Registration Desk Open**

9:00 - 4:00p     **Faculty Development Course**

FD1     **Educational Scholarship 101: Taking Your Teaching to Publication**     Harborview

*Susan J. Pasquale, IAMSE Chair of Education Scholarship, University of Massachusetts Medical School,  
Katie Huggett, Creighton University School of Medicine,  
Floyd C. Knoop, Creighton University School of Medicine,  
Dani McBeth, IAMSE Chair of Publications, The Sophie Davis School of Biomedical Education,  
Peter de Jong, IAMSE Editor-in-Chief, Medical Science Educator, Leiden University Medical Center*

FD2     **Comprehensive Curriculum Evaluation Design**     Skyway/Pier

*Veronica Michaelson, Elizabeth Bradley, University of Virginia School of Medicine*

FD3     **Simulation: Demonstrating the Clinical Relevance of the Basic Sciences**     Williams

*David Pederson, Diana Callender, Sandor Vigh, Maria Sheakley, and Sean Gnecco, Ross University School of Medicine,  
John Szarek, Commonwealth Medical College*

4:00 - 6:00p     **Pre Conference Workshops**

**Developing Examinations for Integrated Courses Using the NBME Customized Assessment Services**     Bayboro

*Agata P. Butler, National Board of Medical Examiners*

**IAMSE Fellowship Program**     Williams

4:00 - 6:30p     **Medical Science Educator Reviewer Workshop (Closed Session)**     Harborview

*Peter de Jong, IAMSE Editor-in-Chief, Medical Science Educator, Leiden University Medical Center,  
Sonia Crandall, Wake Forest School of Medicine,  
Sheila Chauvin, Louisiana State University Health Sciences Center*

## DAILY PROGRAM SCHEDULE

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Saturday, June 18, 2011

6:30 - 7:00p	<b>Welcome Ceremony &amp; Educational Scholarship Awards</b>	Grand Bay
7:00 - 8:00p	<b>IAMSE Welcome Reception</b>	Grand Bay

## DAILY PROGRAM SCHEDULE

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Sunday, June 19, 2011

7:00 - 6:30p	<b>Registration Desk Open</b>	
7:00 - 8:00	<b>Continental Breakfast</b>	Lobby II
8:00 - 8:30a	<b>IAMSE Welcome and Opening Remarks</b>	Grand Bay
8:30 - 9:30a	<b>Plenary 1:</b>  <b>Scientific Foundations for Future Physicians</b>  <i>William Galey, Howard Hughes Medical Institute</i>	Grand Bay
9:30 - 9:45a	<b>Oral Presentation – Using Competency Assessment to Increase Student Self-Awareness in PBL Exercises</b>  <i>Nancy Howell, The University of Tennessee College of Veterinary Medicine</i>	Grand Bay
9:45 - 10:00a	<b>Coffee Break</b>	Lobby II
10:00 - 1:00p	<b>Workshop Session I</b>	
1WS1	<b>Integrating Basic Science into Clinical Training: How to Develop a Curriculum</b>  <i>Amy Wilson-Delfosse, Daniel Wolpaw, and James P. Bruzik, Case Western Reserve University School of Medicine</i>	Grand Bay
1WS2	<b>Professionalism: Making a Difference vs. Finding a Deviance</b>  <i>Stephanie Cizek, Terry Wolpaw, Elizabeth McKinley, and Kevin Fang, Case Western Reserve University School of Medicine</i>	Skyway/Pier
1WS3	<b>The Outcomes Logic Model: An Approach for Program Planning and Evaluation</b>  <i>Nagaswami Vasan, New Jersey Medical School Nehad El-Sawi, Central Michigan College of Medicine Darshana Shah, Joan C. Edwards School of Medicine Susan Pasquale, University of Massachusetts School of Medicine</i>	Bayboro

## DAILY PROGRAM SCHEDULE

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Sunday, June 19, 2011

	<b>1WS4 Educational Initiatives for Competency in Research Literacy: Implications for both Basic Science and Clinical Practice</b>	Williams
	<i>des Anges Crusier, University of North Texas Health Science Center Heather Zwickey, National College of Natural Medicine Cynthia Long, Palmer College of Chiropractic Roni Lyn Evans, Northwestern Health Sciences University Discussants: Aviad Haramati, Georgetown School of Medicine, and Frank Papa UNTHSC, TCOM</i>	
	<b>1WS5 Immunity to Change</b>	Demens
	<i>Michele Manting, Florida State University College of Medicine</i>	
	<b>1WS6 Critical reflection in Medical Education.</b>	Harborview
	<i>Marieke Kruidering &amp; Patricia O'Sullivan , University of California San Francisco</i>	
1:00 - 2:15p	<b>New Member Lunch</b>	St. Petersburg 1
	<b>Networking Lunch</b>	Grand Bay
	<b>Harvard Macy Alumni Lunch</b>	Grand Bay
2:15 - 3:15p	<b>IAMSE Business Meeting</b>	Grand Bay
3:15 - 4:45p	<b>Poster, eDemo &amp; Exhibitor Viewing</b>	Grand Bay
4:45 - 6:15p	<b>Focus Session I</b>	
	<b>1FS1 Meet the Speaker</b>	HTC Room 1
	<i>William Galey, Howard Hughes Medical Institute</i>	
	<b>1FS2 PBL/TBL: Opposites? Same? What gives?</b>	HTC Room 3
	<i>Amy Wilson-Delfosse and Daniel Wolpaw, Case Western Reserve University School of Medicine Paul Koles and Dean Parmelee, Wright State University Boonshoft School of Medicine Amanda Emke, Washington University in St. Louis School of Medicine</i>	



## DAILY PROGRAM SCHEDULE

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Sunday, June 19, 2011

- |      |  |             |
|------|--|-------------|
| 1FS3 | <b>Basic Science to Clinical Humanities - Requiring Research Experience in the Medical Curriculum</b>  | Harborview  |
|      | <i>Martine Coue, Naomi L. Lacy, and Curt Pfarr, Paul L. Foster School of Medicine, Texas Tech University Health Science Center</i>   |             |
| 1FS4 | <b>Development of a Multi-Institutional Qualitative Research Proposal to Identify Strategies Used by Low Ranked Matriculating Students Who Outperform Expectations</b>   | Skyway/Pier |
|      | <i>Kevin D. Phelan and Bruce W. Newton, University of Arkansas for Medical Sciences</i>  |             |
| 1FS5 | <b>Interprofessional Teamwork in Healthcare Practice and Training: Developing Curriculum for the Next Decade</b>   | Bayboro     |
|      | <i>Herbert Janssen, Paul L. Foster School of Medicine, Texas Tech University Health Sciences Center, Cindy Acton, School of Nursing, Texas Tech University Health Sciences Center<br/>Jason Wasserman, Kansas City University of Medicine and Bioscience</i> |             |
| 1FS6 | <b>Student Development for a New Curriculum</b>  | Williams    |
|      | <i>Chris Burns and Veronica Michaelsen, University of Virginia School of Medicine</i>  |             |
| 1FS7 | <b>Can Clinical Relevance, Ethics, and Communication Skills Intersect in the Basic Science Classroom?</b>  | Demens      |
|      | <i>Ferhan Sagin, Ege University Medical Faculty, Jeanne Schlesinger, Virginia Commonwealth University School of Medicine, Kimberly Fisher, Virginia Commonwealth University School of Medicine</i>   |             |

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## DAILY PROGRAM SCHEDULE

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Monday, June 20, 2011

6:45 - 7:45a	<b>Editorial Board Breakfast (Closed Session)</b>	Bayboro
6:45 - 7:45a	<b>Roundtable Breakfast Discussions</b>  <b>How to grow IAMSE membership</b> – <i>Greg Smith</i> <b>President meeting with students</b> - <i>Frazier Stevenson</i> <b>Professionalism</b> - <i>Lon van Winkle</i> <b>Hot Topics in Technology</b> – <i>Bob McAuley</i> <b>Integration of Basic and Clinical Sciences</b> – <i>Bill Jeffries</i>	Grand Bay
6:45 – 7:45a	<b>Continental Breakfast</b>	Lobby II
6:45 - 6:30p	<b>Registration Desk Open</b>	
7:45 - 8:00a	<b>IAMSE Welcome and Opening Remarks</b>	Grand Bay
8:00 - 9:00a	<b>Plenary 2:</b>  <b>Developing Relationships and Professional Behavior in a Basic Sciences Curriculum</b>  <i>Aviad Haramati, Georgetown University School of Medicine</i>	Grand Bay
9:00 - 9:15a	<b>Oral Presentation – An interprofessional educational forum improves allied health student cooperation and teamwork.</b>  <i>Chad Lairamore, University of Central Arkansas</i>	Grand Bay
9:15 - 9:30a	<b>Coffee Break</b>	Lobby II
9:30 - 12:30p	<b>Workshop Session II</b>  2WS1 <b>Promoting Professional Behavior in Concrete Ways Through Critical Reflection by Students in Medical Basic Science Courses</b>  <i>Lon Van Winkle, Midwestern University</i>  2WS2 <b>Enhancing Opportunities for Professionalism Development in Basic Sciences Courses</b>  <i>Sheila W. Chauvin, Louisiana State University Health Sciences Center</i> <i>Sonia J. Crandall, Wake Forest University School of Medicine, Wayne</i> <i>T. McCormack, University of Florida College of Medicine</i>	Harborview        Skyway/Pier

## DAILY PROGRAM SCHEDULE

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Monday, June 20, 2011

2WS4	<b>Mind Body Medicine</b> <i>Aviad Haramati, Georgetown University School of Medicine</i>	Williams
2WS5	<b>Integrating Clinical Skills and Competencies into the First 2 Years of the Medical Curriculum</b> <i>Phillip Cooles, Liris Benjamin, Harold Schiff, Diana Callender, Dave Pederson, Ross University School of Medicine</i>	Demens
2WS6	<b>Implementing Team-Based Learning: How to Make It Work</b> <i>Amanda Emke, Washington University in St. Louis School of Medicine Paul Koles, Wright State University Boonshoft School of Medicine Dean Parmelee, Wright State University Boonshoft School of Medicine</i>	HTC Room 3
12:30 - 1:30p	<b>Lunch - NBME Update</b> <i>Agata P. Butler, PhD, National Board of Medical Examiners</i>	Grand Bay
1:30 - 1:45p	<b>2012 Presentation</b>	Grand Bay
1:45 - 2:45p	<b>Plenary 3:</b> <b>Science Education in a Medical Curriculum: Teaching Science or Training Scientists?</b> <i>Friedo Dekker, Leiden University Medical Center</i>	Grand Bay
2:45 - 3:00p	<b>Oral Presentation - Enhancing medical education with longitudinal cases: bridging basic science and clinical knowledge</b> <i>Mark Sandefur, Mayo Clinic</i>	Grand Bay
3:00 - 4:30p	<b>Poster, eDemo, &amp; Exhibitor Viewing</b>	Grand Bay
4:30 - 6:00p	<b>Focus Session II</b> <b>2FS1 Using Exams as an Active Learning Platform</b> <i>Frazier Stevenson, University of South Florida College of Medicine</i>	Harborview

## DAILY PROGRAM SCHEDULE

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Monday, June 20, 2011

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|------|---|-------------|
| 2FS2 | <b>Teaching Students Specific Scientific Skills by Involving a Large Number of Students in a Distributed Research Setup</b>   | Skyway/Pier |
|      | <i>Friedo W. Dekker and Peter G.M. de Jong, Leiden University Medical Center</i>  |             |
| 2FS3 | <b>Making the Most out of IAMSE Webcast Audio-Seminars (WAS)</b>  | Bayboro     |
|      | <i>Nehad El-Sawi, Central Michigan University College of Medicine<br/>E. Pat Finnerty, Des Moines University<br/>Dennis Baker, Florida State University<br/>Giulia Bonaminio, University of Kansas School of Medicine</i> |             |
| 2FS4 | <b>The Translational Curriculum: From Basic Science to Clinical Rotation</b>  | Williams    |
|      | <i>Edward C. Klatt, Mercer University School of Medicine</i>  |             |
| 2FS5 | <b>Incorporating Professional Development Into Basic Science Classrooms and Laboratories</b>  | Demens      |
|      | <i>India Lane and Nancy Howell, The University of Tennessee College of Veterinary Medicine</i>  |             |
| 2FS6 | <b>Bridging the Chasm: Integrating Translational Research into Medical Education</b>  | HTC Room 3  |
|      | <i>Templeton Smith, West Virginia University School of Medicine<br/>Scott Cottrell, West Virginia University School of Medicine<br/>Terry Stratton, University of Kentucky College of Medicine</i>                        |             |
| 2FS7 | <b>Peer Facilitators for Pathology Curricula</b>  | HTC Room 1  |
|      | <i>Nicholas P. Ziats, Case Western Reserve University School of Medicine, Cynthia Arvizo, Case Western Reserve University School of Medicine, Margret S. Magid, Mount Sinai School of Medicine</i>                        |             |

6:45p      **Gala Dinner – Dali Museum**

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## DAILY PROGRAM SCHEDULE

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Tuesday, June 21, 2011

7:00 - 8:00a	<b>IAMSE Fellowship Breakfast (Closed Session)</b>	Bayboro
7:00 – 8:00a	<b>Roundtable Breakfast Discussions</b>  <b>Competencies</b> – <i>Carlos Isada</i> <b>Publishing in Medical Science Educator</b> - <i>Peter de Jong</i> <b>Mentoring</b> – <i>David Franklin</i> <b>Interprofessional Education</b> – <i>Greg Smith</i> <b>Use of Social Media Applications</b> - <i>Julie Hewett</i>	Grand Bay
7:00 – 8:00a	<b>Continental Breakfast</b>	Lobby II
7:00 - 11:30a	<b>Registration Desk Open</b>	
8:00 - 9:30a	<b>Poster Discussions</b> <ul style="list-style-type: none"><li>• Curriculum – Even Posters</li><li>• Curriculum – Odd Posters</li><li>• E-Learning &amp; Technology</li><li>• Instructional Method &amp; Faculty Development</li><li>• Student Assessment &amp; Program Evaluation</li><li>• TBL/PBL/Small Group Learning</li></ul>	Harborview Skyway/Pier Bayboro Williams Demens HTC Room 3
9:30 - 9:45a	<b>Break</b>	Lobby II
9:45 - 10:00a	<b>Poster Award Presentations</b>	Grand Bay
10:00 - 10:15a	<b>Oral Presentation - Scoring Clinical Exams with the Apple iPad</b>  <i>Rick Ash, University of Utah School of Medicine and University IT</i>	Grand Bay
10:15 - 11:15a	<b>Plenary 4</b>  <b>Use of Simulation to Assess Competencies and Improve Healthcare</b>  <i>William C. McGaghie, Northwestern University Feinberg School of Medicine</i>	Grand Bay
11:15 - 11:30a	<b>Closing Remarks</b>	Grand Bay

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## ANNUAL BUSINESS MEETING AGENDA

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Welcome	Amy Wilson-Delfosse
President's Address	Frazier Stevenson
<ul style="list-style-type: none"><li>• Recognition of Outgoing Board Members</li><li>• Installation of Incoming Members of the Board of Directors</li><li>• Council of Academic Societies</li><li>• Outcomes of the Annual Board Meeting</li></ul>	
Election of Members for the Nominating Committee	Amy Wilson-Delfosse
Annual Financial Report	Bruce Newton
Standing Committee Updates	Frazier Stevenson
<ul style="list-style-type: none"><li>• Development Committee</li><li>• Membership Committee<ul style="list-style-type: none"><li>◦ Recognition of 5 &amp; 10 Year Members</li></ul></li><li>• Educational Scholarship Committee</li><li>• Publications Committee</li><li>• Webcast Audio Seminars (WAS)</li></ul>	
Report from the Editor-in-Chief	Peter de Jong
Annual Association Meetings	
<ul style="list-style-type: none"><li>• 2012, Portland Oregon, Nehad El Sawi, Program Chair</li></ul>	
Membership Forum	
Adjournment	

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## IAMSE MASTER TEACHER AND SCHOLAR AWARDS

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### IAMSE Awards Program to Promote Teaching Excellence and Educational Scholarship in the Medical Sciences

#### Overview

The IAMSE established three prestigious awards in 2005 to recognize and promote teaching excellence and educational scholarship in the medical sciences. Below are brief descriptions. Complete details are available on the IAMSE website. All IAMSE members should read carefully the complete descriptions of these award programs before submitting nomination packets. Questions and comments should be directed to Dr. Joe Stein, Chair, IAMSE Awards Sub-Committee. (steinj@upstate.edu)

#### Best Poster Presentation Award

The Best Poster *Presentation Award* recognizes the most outstanding medical education peer-reviewed presentation at the IAMSE annual meeting. First authors must be IAMSE members in good standing. Using a multi-phased, peer review process and established educational scholarship criteria, finalists are identified from the accepted presentation proposals. Finalist presentations are recognized during the meeting. During the conference, peer-reviewers observe and assess finalists' presentations based on educational scholarship and effective presentation criteria. The award presentation is announced at the final conference session. The first author/presenter receives a plaque and one-year IAMSE Membership and access to the IAMSE WebCast Audio-Seminars. Co-authors are also recognized and receive certificates.

#### Master Teacher Award

This annual award was established to honor an IAMSE member who, over the course of many years, has consistently demonstrated extraordinary excellence in teaching both at his/her institution and within IAMSE. Any teaching can be recognized, but nominations of members who have been active teachers at the annual IAMSE meetings or web seminars are particularly encouraged. IAMSE members may self-nominate or be nominated by another IAMSE member. The Awards Committee reviews all nominations and supporting documentation based on established criteria and selects finalists. Final approval of each award recipient rests with the IAMSE Board of Directors. A finalist who does not win the award will be automatically reconsidered the next year, if they agree and update their nomination file.

Nominees should submit:

- three letters of support
- curriculum vita
- a list of teaching activities at their institution and at IAMSE

Documentation of the quality of teaching, which should include all of the following:

- student evaluations
- the number and nature of teaching awards, including who voted on the award (student, peers, etc.)
- peer evaluation of teaching quality
- evaluations of IAMSE sessions by members

The award recipient is recognized at the annual meeting and receives a plaque, and one-year IAMSE Membership and access to the IAMSE WebCast Audio-Seminars.

## **IAMSE MASTER TEACHER AND SCHOLAR AWARDS (CONT.)**

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### **Master Scholar Award**

This award recognizes an IAMSE member who has a distinguished record of educational scholarship, including educational research and/or dissemination of excellent and scholarly approaches to teaching and education (e.g., development of multimedia medical educational programs, research in the areas of curriculum design and evaluation, student assessment, innovative programs and methods, etc.). IAMSE members may self-nominate or be nominated by another IAMSE member. Award recipients are selected based on the impact, ingenuity, and longevity of educational scholarship and their records of publications, presentations, and other forms of dissemination of educational scholarship. The Awards Committee reviews all nominations and supporting documentation based on established criteria and selects finalists. Final approval of each award recipient rests with the IAMSE Board of Directors. A finalist who does not win the award will be automatically reconsidered the next year, if they agree and update their nomination file. Final approval of the award recipient rests with the IAMSE Board of Directors.

Nomination packets must include:

- curriculum vita
- three letters of support
- examples of appropriate work

The award recipient is recognized at the annual meeting and receives a plaque, and one-year IAMSE Membership and access to the IAMSE WebCast Audio-Seminars.

### **Award Implementation Timelines**

A general timeline for the implementation of the Master Teacher and Master Scholar nomination/application and review/selection process is shown below. Deadlines, instructions, forms, and up-to-date program descriptions are available on the IAMSE website.

#### **Master Teacher and Master Scholar Awards General Timeline for Annual Implementation:**

<b>TIME PERIOD</b>	<b>ACTIVITY</b>
December	Call for nominations via annual conference and follow up email distribution
February 3	Deadline for receipt of nominations
February– March	Awards committee reviews nominations
July	Presentation of awards to recipients at annual meeting

## **IAMSE MASTER TEACHER & SCHOLAR AWARD WINNERS**

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### **Master Teacher Award Winners**

**2011** - Jay H. Menna, Ph.D., University of Arkansas for Medical Sciences

**2010** - Thomas Schmidt, Ph.D., University of Iowa

**2009** - Uldis Streips, Ph.D., University of Louisville

**2008** - Robert Klein, Ph.D., University of Kansas School of Medicine

**2007** - Susan Gagliardi, Ph.D., University of Massachusetts Medical School

### **Master Scholar Award Winners**

**2011** - Paul Haidet, M.D., M.P.H, Pennsylvania State University College of Medicine

**2010** - Adi Haramati, Ph.D., Georgetown University

**2009** - Thomas Nosek, Ph.D., Case Western Reserve University

**2008** - Gary Rosenfeld, Ph.D., University of Texas, Houston Medical School

## 2011 Master Teacher Award – Dr. Jay H. Menna



Dr. Jay H. Menna was born in Toledo, Ohio. He received his B.S. Degree in Medical Technology, Magna Cum Laude from Jacksonville University, Jacksonville, Florida, and his M.A. and Ph.D. in Microbiology and Immunology from the State University of New York at Buffalo. He completed a post-doctoral fellowship at Vanderbilt University and then accepted a position at the University of Arkansas for Medical Sciences (UAMS), College of Medicine, as Assistant Professor of Microbiology and Immunology. Dr. Menna served for 23 years as the Associate Dean for Undergraduate Medical Education (UME). As Associate Dean he undertook a complete revamping of the freshman and sophomore curricula. Working with others the curriculum was transformed from a discipline-based modality to a highly integrated organ-system based approach with integrated computer-based examinations and clinical case conferences. Dr. Menna received eight Golden Apple Awards by vote of medical students for outstanding teaching. He received 28 Red Sash Awards from graduating senior classes for excellence in teaching and mentoring. Dr. Menna received the UAMS, S.N.M.A. Faculty Award for Academic Support of Minority Medical Students. He was voted best educator Sherwood, Arkansas by a mayoral council on education. He co-authored a text with Drs. Bruce W. Newton and Patrick W. Tank titled, *How to Become an Effective Course Director*, Springer, 2009. After 33 years at UAMS, Dr. Menna retired in 2007 as Emeritus Professor. Dr. Menna is the first Emeritus Member of the IAMSE. He continues to assist faculty in enhancing their teaching at UAMS.



## 2011 Master Scholar Award – Dr. Paul Haidet

Paul Haidet MD MPH is the Director of Medical Education Research and a Professor of Medicine, Humanities, and Public Health Sciences at the Pennsylvania State University College of Medicine. He completed his MD degree and residency training in internal medicine at the Penn State College of Medicine and Hershey Medical Center. After that, he completed a fellowship in general internal medicine at the Beth Israel Deaconess Medical Center, and his MPH degree at the Harvard School of Public Health. Prior to his current appointment, he spent 11 years on the faculty of the Baylor College of Medicine and was a member of the Health Services Research Center of Excellence at the Michael E DeBakey Veterans Affairs Medical Center in Houston, Texas.

Dr Haidet's career has focused on relationships in medicine, and he has published over 60 peer-reviewed articles in several areas, including medical professionalism and the culture of medical education, teaching cultural competency, Team-Based Learning, and inter-professional education. He is a member of the board of directors of the Team-Based Learning Collaborative, and is a deputy editor for the journal *Medical Education*. He also serves as the 2011 president of the American Academy on Communication in Healthcare, the leading North American organization devoted to improving healthcare communication. Dr. Haidet is an avid jazz music fan, and has incorporated this interest into his teaching, using jazz as a vehicle to teach improvisational skills in medicine; his work in this area was featured in *Jazz Times* magazine. Dr. Haidet lives in Hershey Pennsylvania with his wife Mary Lynn Fecile and sons Alex and Jonathan.

## **IAMSE MEDICAL EDUCATOR FELLOWSHIP**

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The IAMSE Medical Educator Fellowship is composed of three phases that can be completed in 3 years. Phase 1 consists of the currently offered Essential Skills in Medical Education (ESME) program. The ESME program is offered several times a year at the AMEE Conference, Ottawa Conference and the Annual IAMSE Conferences.

### **Program Objective:**

The goal of this program is to develop better medical educators. The program will foster development in key aspects of medical education by providing targeted professional development. The program will provide those completing the program with evidence of specialized achievement to enhance and support career advancement as medical sciences educators.

### **Program Description:**

The program covers five content areas: curriculum design, teaching methods and strategies, assessment, educational scholarship, and leadership; and consists of three phases:

**Phase 1:** Completion of the ESME Program.

**Phase 2:** Advanced courses (designated as such on the Annual Meeting Program) and symposia offered at the IAMSE annual meeting.

**Phase 3:** A required portfolio demonstrating application of content themes at participant's home institution. Participants will be expected to submit a project proposal prior to the 2009 Annual Meeting.

### **Who Should Participate:**

The program is designed for medical science educators who have complete the ESME program, and are seeking to become more knowledgeable as educators and leaders. Participants will complete a project portfolio that demonstrates how they applied program content areas at their home institutions.

Detailed information on the Fellowship is available on the IAMSE website.

### **Application Requirements:**

Completion of the ESME course required for enrollment in Phases 2 and 3 of the IAMSE Medical Educator Fellowship. Applications to the Fellowship must be submitted by the IAMSE 2009 Annual Meeting Early Registration deadline via the Annual Meeting Registration Form. Attendance is limited to 6 Fellows and will be on a first-come first-serve basis. The Fellowship fee of \$500 USD includes the 3 hour conference workshop modules and materials. Payment is due in full by the meeting's Early Registration deadline. Refund requests must be received in writing one month prior to the course. No refunds will be made after that date.

## **IAMSE Medical Educator Fellows**

**2011** - David Pederson & Liris Benjamin

**2010** - Vaughn Kippers

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## EXHIBITOR DESCRIPTIONS

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### **ADInstruments' Medical Laboratories**

ADInstruments' Medical Laboratories – Learn Physiology in a Clinical Context

LabTutor Medical Laboratories are perfect for medical students studying medical physiology. The computer-based system brings real patients into the teaching laboratory using high-quality patient videos, patient data and test results. Physiological data acquisition and analysis exercises for the students are integrated in every laboratory.

Students can:

- Get hands-on practice measuring physiological parameters
- Access patients' clinical test covering a range of medical conditions
- Access specialized test results such as MRI and CT scans
- View high-quality video interviews of patients
- Compare their recordings with patient data
- Compare their developed diagnoses with those from medical consultants

### **American Association of Anatomists (AAA)**

The American Association of Anatomists was founded in Washington, D.C. in 1888, for the "advancement of anatomical science." Today, AAA is the professional home for an international community of biomedical researchers and educators focusing on anatomical form and function. In addition to being the primary educators of medical students in their first year of medical school, AAA members worldwide work in imaging, cell biology, genetics, molecular development, endocrinology, histology, neuroscience, forensics, microscopy, physical anthropology, and numerous other exciting and developing areas. Anatomy is a vibrant and growing discipline, truly the backbone of biomedical science.

### **American Physiological Society (APS)**

The American Physiological Society is a professional scientific membership organization devoted to fostering scientific research, education, and the dissemination of scientific information. The APS supports a variety of educational activities including programs and fellowships to encourage the development of young scientists at the undergraduate and graduate levels, with a particular focus on women and underrepresented minorities. APS also supports refresher courses and teaching awards promoting continued excellence in education at the professional level. Founded in 1887, the Society's membership includes more than 10,000 professionals in science and medicine. The Society annually publishes 4,000 research articles in 14 scientific journals.

### **Anatomage, Inc.**

Anatomage, Inc. is the creator of the Invivo5 3D imaging software and The Table, which is a life-sized, touch-screen interactive anatomy visualization system of 3D anatomy for cadaver based dissection courses.

## EXHIBITOR DESCRIPTIONS

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### **Association of Medical Education in Europe (AMEE)**

Members of AMEE are teachers and organizations or national bodies committed to high standards of education in medicine and the health care professions.

AMEE is concerned with the continuum of education from undergraduate or basic training through postgraduate, specialty or vocational training to continuing education.

AMEE is concerned with the facilitation of high quality research in medical education and with the dissemination of the findings.

AMEE recognizes the need to appraise, and where necessary, improve the quality of teaching.

AMEE serves as a source of advice on matters relating to medical education in a national, European and world-wide context.

AMEE encourages students and junior staff to take an interest in medical education and assists with the development of the skills required by medical teachers.

AMEE assists physicians and teachers in the health-care professions to keep up to date with current developments in medical education.

AMEE encourages and offers assistance with the development of high quality learning resources and assessment materials.

AMEE is concerned with the development of medical education to meet current and future needs, in the global context.

### **DecisionSim™**

DecisionSim™, created by educators for educators, enables healthcare providers, academic institutions and professional societies to cost-effectively develop, improve and assess the clinical decision-making skills of their healthcare professionals, staff and students—regardless of topic or level of training. With a web-based platform and easy-to-use authoring tools, authors can quickly create adaptive, interactive educational experiences based on branched narrative scenarios that leverage the power of story-telling. Case conditions are tailored to each learner's knowledge level to facilitate an optimal learning environment. In turn, educators are able to effectively track, analyze and respond to learner performance metrics. To learn more, visit [www.DecisionSimulation.com](http://www.DecisionSimulation.com).

### **DxR Development Group, Inc.**

DxR Development Group is proud to exhibit its Clinical Competency Examination (CCX) and Clinical Skills Examination (CSE) software.

- The CCX software – a set of tools designed to work with standardized patients – allows students to document their findings and enter diagnoses and management after they see the SP. The CCX grading tool allows faculty members to evaluate student findings in the context of clinical practice behavior.
- The CSE software allows faculty to access the students' patient notes after they see the SP. CSE provides a web-ready solution for preparing students for the USMLE Step 2 CS Exam.

## EXHIBITOR DESCRIPTIONS

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### **ExamSoft Worldwide, Inc.**

ExamSoft Worldwide, Inc. develops and distributes software solutions encompassing all elements of the exam administration process. Our mission is to develop solutions enabling medical and other health professions institutions to efficiently and affordably migrate to a secure high-stakes assessment platform.

Since incorporation in 1998, ExamSoft has provided clients the means by which to item bank their own questions, categorize them for competency-based scoring and securely deliver them as high-stakes examinations on student-owned laptops or school-owned PC's. It is uniquely capable of delivering & retrieving exams via the Internet while never requiring Internet connectivity during an exam and can do so on both PC's & Mac's. Thanks in part to this unique approach, our solution remains the most widely used program within the legal assessment channel and has expanded its use to a broad range of institutions including ever expanding growth in the health professions.

### **Falcon Physician Reviews**

Falcon Physician Reviews is strategically designed to provide high yield, comprehensive review programs for today's physicians in training, at every stage of their medical licensing. Falcon began by providing a review program intended mainly for students from Caribbean medical schools who were seeking more in-depth review of the material to be covered on medical exams, or who had already taken the exam and had difficulties with it. As Falcon grew, we began to receive enrollments from US schools, and we now receive students from all around the world, for our lecture review programs as well as our online courses.

Falcon Physician Reviews currently helps over 2,000 students per year achieve their goals on the USMLE/COMLEX. By focusing on study and preparation, Falcon Physician Reviews has developed and created programs that include USMLE Steps 1 & 2 and COMLEX Levels 1 & 2 Live reviews, as well as Falcon'Online and Falcon'2go, which feature online streaming video. With our Falcon'Online and Falcon'2go programs, we offer unparalleled test preparation from any location where a quality high-speed internet is available. Our innovative, patented learning system & talented MD/PhD faculty, along with our dedication to excellence in education, have helped thousands of students graduate with the tools necessary to achieve their USMLE and COMLEX goals. We sincerely hope you'll be next.

### **The National Board of Medical Examiners®**

The NBME is an independent, not-for-profit organization that provides high-quality examinations for the health professions. Protection of the health of the public through state of the art assessment of health professionals is the mission of the NBME, along with a major commitment to research and development in evaluation and measurement. The NBME was founded in 1915 because of the need for a voluntary, nationwide examination that medical licensing authorities could accept as the standard by which to judge candidates for medical licensure. Since that time, it has continued without interruption to provide high quality examinations for this purpose and has become a model and a resource of international stature in testing methodologies and evaluation in medicine.

## EXHIBITOR DESCRIPTIONS

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### **Primal Pictures Limited**

Primal Pictures Limited will be showing the future of digital medical education - today!

Anatomy & Physiology Online is a guided learning approach for students that provide clear 3D models and engaging, multimedia content covering anatomy and physiology up to 2 semester level. Learning objective guide students along with reviews, case studies and quizzes throughout. Also, Primal will be showing their other digital products that are already being used at over 700 institutions worldwide. Our detailed and accurate 3D models cover the whole body both regionally and systemically with interactive functions allowing you to rotate, add/remove layers and label any structure. Primal's 20 years of expertise and development make their products the must-have digital resource and benefit from being able to cover many different courses with access available online through [www.anatomy.tv](http://www.anatomy.tv).

So come to our booth for a demonstration or go to [www.primalpictures.com](http://www.primalpictures.com) to find out more.

### **Team-Based Learning Collaborative (TBLC)**

The Team-Based Learning Collaborative was established in 2004 to support the dissemination of team-based learning in health professions education and to facilitate a process whereby health science educators could engage in collaborative discussion, share instructional materials, and learn how to develop team-based learning modules in their courses and curricula. In addition, the Collaborative promotes evaluation and scholarship of TBL in health professions education. Membership in the Collaborative includes educators in medical, dental, nursing, veterinary, and allied health science fields. Educators in these fields are welcome to contact the leadership of the Collaborative to engage a 'consultant' to coach them through the development of a module, conduct workshops on TBL, observe an on-going TBL course at a health science school, or obtain more information on strategy. Visit [www.tblcollaborative.org](http://www.tblcollaborative.org) to learn more.

### **Touch of Life Technologies, Inc.**

The VH Dissector, from Touch of Life Technologies, Inc., provides an interactive cadaver experience. This revolutionary new software to teach anatomy using the Visible Human Project data not only allows you to dissect and rebuild the human body, but provides customizable lesson plans as well. Visit [www.toltech.net](http://www.toltech.net) to learn more.

### **Turning Technologies, LLC**

Turning Technologies, LLC develops response systems designed specifically to increase learning outcomes. Proven research-based student response technologies enable instructors to promote student retention and gather valuable data needed to increase the effectiveness of instruction. The company's interactive polling software applications, TurningPoint and TurningPoint AnyWhere, combine with either durable ResponseCard clickers or ResponseWare mobile response applications to provide the most advanced combination of knowledge and technology currently available in the field of student assessment.

## ABSTRACTS

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### Abstracts by Category

- Curriculum
- E-Learning
- Faculty Development
- Instructional Methods
- Program Evaluation
- Student Assessment
- TBL/PBL/Small Group Learning
- Technology

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## **INTEGRATING THE "BUSINESS SIDE OF MEDICINE" INTO A PRECLINICAL PRACTICE OF MEDICINE MODULE**

Rebecca Moroosse, Soraya Smith, Morayma Cubero and Andrea Berry, University of Central Florida College of Medicine

### **PURPOSE**

To enhance the students ability to develop progressively sophisticated insights into the business side of the medical practice by integrating module objectives and experiences within the preclinical Practice of Medicine (P-1/P-2) modules.

### **METHODS**

The P-1 and P-2 modules incorporate bi-weekly preceptor experiences that are designed to reinforce History and Physical Examination skills as well as practical concepts that are encountered in the business side of medical practice. Through this innovative curriculum, students are encouraged to discuss and reflect on topics including patient safety, HR management, regulatory/legal issues and more.

### **RESULTS**

40 second year medical students and 60 first year medical students participated in bi-weekly preceptor experiences from 2009-2011. P-1 and P-2 include 14 and 10 preceptor visits respectively. Qualitative data from bi-weekly reflections reveal knowledge gained from discussions with preceptors and module evaluations completed by students support the use of the curriculum.

### **CONCLUSIONS**

The preceptor experience in the Practice of Medicine modules provides a unique opportunity to introduce students to the business aspects of medicine. In order to be successful, the curriculum must be flexible to adapt to the individual practice idiosyncrasies and preceptors must be oriented to the goals using a standardized handbook.

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## **INTEGRATION OF BASIC AND CLINICAL SCIENCE – WHAT IS THE PROBLEM?**

Birgitta Björck and Hans Gyllenhammar. Department of Medicine, Karolinska Institute, Karolinska University Hospital Huddinge, SE14186 Stockholm, Sweden

### **PURPOSE**

The new Karolinska curriculum was introduced in the fall semester of 2007. It is theme-based and integrated with basic science and clinical science side by side throughout the 11 semesters. The curriculum states that the first 4 semesters should have at least 10 percent clinical studies and that the remaining 6 should have at least 10 percent basic science. Additionally there is one semester that is entirely devoted to a degree project. We have studied the outcome of the ambition to integrate basic science into clinical science in the major clinical course – the course in clinical medicine which is 32 weeks semesters 5 and 6.

### **METHODS**

As part of the major course evaluation the students are asked to evaluate, by grading 1 to 10, the extent to which basic science was integrated into clinical education and also to which extent clinical science was integrated with basic science during the course. Additionally the students are asked to evaluate to which extent the clinical education promotes scientific competence. We have studied these results for four courses in clinical medicine (2008 to 2010).

### **RESULTS**

The students evaluated the presence of clinical examples in basic science education at 7.6 in the first course after curriculum reform and 6.8 in the latest. The basic science content in clinical education was 7.33 the first semester after curriculum reform thereafter constantly decreasing to 6.3 in the latest evaluation. Similarly their evaluation of the promotion of scientific competence decreased from 7.3 to 6.8.

### **CONCLUSION**

Our interpretation of the data is that immediately after curriculum reform basic and clinical science teachers are more open to integration but soon thereafter they retract into their respective areas of competence and decrease cooperation. This is paralleled by a decrease in the promotion of scientific competence. Successful integration of basic and clinical science requires a continuous effort by teachers and curriculum directors.

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**UNIQUE APPROACHES TO TEACHING MEDICAL MICROBIOLOGY IN A “HANDS-OFF” LABORATORY CLIMATE**

Debra E. Bramblett, Heather Balsiger, Amy E. Trott, Department of Medical Education, Paul L. Foster School of Medicine, Texas Tech University Health Sciences Center, El Paso, TX 79905

**PURPOSE**

In the past, microbiology labs have been an integral component to the teaching of medical microbiology and infectious disease in pre-clerkship years of medical school. With the nation-wide restructuring of the curriculum to a more systems-based approach, medical education is progressing towards modalities that deviate from the traditional laboratory experience. These include the delivery of laboratory concepts within a didactic lecture or in virtual reality simulations. Reasoning for this change in modality includes the high cost of consumable supplies, the labor intensive nature of the session, and difficulties in scheduling. Furthermore, current CLIA requirements have resulted in a reduction in on-site laboratory testing and clinician involvement.

**METHODS**

At Paul L. Foster School of Medicine (PLFSOM), we have chosen a hybrid approach that acknowledges the limitations of the traditional laboratory experience while preserving critical skills and concepts valued within our institutional learning objectives. These align with specific ACGME core competencies emphasizing case-based team lab exercises that preserve essential medical microbiology knowledge and skills conveyed in traditional microbiology laboratory sessions. We have used attitudinal surveys to assess student satisfaction hybrid of microbiology laboratories.

**RESULTS**

Being a new medical school, we are in the process of curriculum development and currently have two classes of pre-clerkship students from which we can assess the value of our curricular design. With the most recent survey, we found that 64% of the students surveyed consider the hybrid case-based labs of high value. Similarly, 70.8% of students felt comfortable practicing their knowledge in this context and 92% felt they would like to participate in more sessions of this kind in the future. Survey results also reflect an increasing student satisfaction with this type of case-based microbiology lab experience.

**CONCLUSIONS**

Being a new medical school, we are in the process of curriculum development and currently have two classes of pre-clerkship students from which we can assess the value of our curricular design. With the most recent survey, we found that 64% of the students surveyed consider the hybrid case-based labs of high value. Similarly, 70.8% of students felt comfortable practicing their knowledge in this context and 92% felt they would like to participate in more sessions of this kind in the future. Survey results also reflect an increasing student satisfaction with this type of case-based microbiology lab experience.

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## **THE EINTHOVEN SCIENCE PROJECT TO STIMULATE BASIC SCIENTIFIC RESEARCH IN THE UNDERGRADUATE MEDICAL SCHOOL CURRICULUM**

Cees A Swenne, Peter GM de Jong, Saskia le Cessie, Arie C Maan, Sumche Man, Hubert W Vliegen, Hans WH Weeda, Martin J Schalij, Ernst E van der Wall. Leiden University Medical Center, Leiden, The Netherlands

### **PURPOSE**

Basic sciences as well as clinical sciences and scientific research skills are topics to be addressed in the medical school curriculum. In the undergraduate years it is difficult to develop a teaching activity integrating all of these three topics. The Einthoven Science Project has been developed to overcome this problem. The project, named after the famous Leiden Nobel Prize Winner Willem Einthoven, is a mandatory project within the first year undergraduate curriculum at Leiden Medical School. The project aims to offer students a realistic scientific research task using the educational strategies of independent discovery and competition.

### **METHODS**

Students follow the ECG practical sessions and record each others electrocardiogram. As is standard in electrocardiography height, weight and sex of the person are registered with the ECG. Each ECG is judged by a clinician to detect any abnormalities; in that case appropriate action is taken. All normal ECG registrations are mathematically synthesized into a vector cardiogram, and the spatial angle between the QRS- and T-axes is computed in addition to conventional ECG characteristics. These data are blinded and added to the database with ECG recordings of previous years. Next, students, working alone or in pairs, formulate a research question, answer the question with the data in the database and report the results in the form of a congress abstract. All students who manage to send in their abstract within 1 week are eligible to run for the Einthoven Student Award by presenting their work to their fellow students and a jury.

### **RESULTS**

The project started in 2005 and the database now holds 1500 normal ECG recordings. While the recording of the ECG itself was not mandatory, in 2010 approximately 300 students did so (95% of all first year students). Examples of research questions developed by the students are "influence of length or body mass index on the ECG" and "differences between male and female ECG recordings". Circa 30% of the students submitted an abstract within 1 week to run for the award. Several award winners continued to perform research in this field and until now by these winners 3 conference presentations have been delivered and 2 papers have been published in peer reviewed international journals.

### **CONCLUSIONS**

The Einthoven Science Project introduces a competitive and inspiring scientific element in the undergraduate Medical School curriculum. It shows that first year students already have great capacities to formulate a relevant research question and to perform scientific research.

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**PURSUIT OF THE HORIZON: A MEDICAL IMMERSION PROGRAM FOR URBAN TEENS**

Kevin Fang, MS<sup>3</sup>, Case Western Reserve University School of Medicine Joseph Helpert, M.Ed., mc<sup>2</sup>STEM High School Klara Papp, Ph.D., Office of Curricular Affairs, Case Western Reserve University School of Medicine

**PURPOSE**

In 2008, 53.7% of Cleveland Public School students graduated on time. A high school dropout is expected to live 9.2 years less than a high school graduate, due to poor health literacy, more chronic disease and lack of insurance. The mission of Horizons is to use the field of medicine to empower local teens as learners and teachers, in order to support intrinsic motivation to achieve academically.

**METHODS**

Horizons is a 7-week program for students at mc<sup>2</sup>STEM, a public high school. Participants begin in 10th grade learning about type 2 diabetes. They return in 11th and 12th grades to explore new health topics. Activities include physician shadowing, problem-based learning, self-reflection, and creation of a public service announcement. Each 10th grader is assigned an undergraduate and a medical student to create mentoring relationships over 3 years. Data were collected on self-efficacy, academic interest and Ohio Graduation Test (OGT) scores from 10th grade participants (n=16) and matched-comparison non-participant peers. Self-efficacy is one of the best predictors of academic achievement.

**RESULTS**

Due to transportation challenges, only 9 10th graders completed the 10th grade curriculum. Only 4 of those completed both pre- and post-program surveys, which assessed self-efficacy and academic interest. No significant differences were seen between participants (n=4) and matched-comparison controls. One participant changed his stated career goal from engineer to doctor. OGTs will be taken in March 2011.

**CONCLUSION**

Implementation of Horizons demonstrates its feasibility and reproducibility. At this time, the sample size is too small to enable estimates of the program's impact. Statistically significant data will require multiple class cohorts.

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**DESIGN/IMPLEMENTATION OF AN INTEGRATED MICROANATOMY CURRICULUM USING A NORMAL VS. ABNORMAL PARADIGM**

Virgil Thomas Gaddy, Ph.D. Department of Cellular Biology and Anatomy Medical College of Georgia-University of Georgia Medical Partnership Campus 279 Williams Street Athens, GA USA

**PURPOSE**

The study of medical microanatomy typically spans two years. First-year histology courses generally study the normal structure and function of cells, tissues, and organs; second-year pathology courses emphasize histopathology of disease states. This poster describes a model of education in which principles of histology are taught by contrasting normal and abnormal microscopic structures.

**METHODS**

In an organ systems-based curriculum, histology principles were contextualized by studying histopathologic states alongside that of normal structure and function. A combination of lecture, TBL, lab, and patient-centered small group discussions were used. Beyond contrasting structure, faculty related abnormal structure to disease processes and clinical manifestations. All assessment items resembled USMLE format.

**RESULTS**

Thirty-three hours are dedicated to formal microanatomy instruction: 11 hours of lecture, 15 hours of lab, and 7 hours of TBL exercises, with additional microanatomy concepts covered in small group. Five lecture hours introduced cell biology principles early in the year. Lymphoid system histology was deferred to phase 2 to coincide with the histopathology of cancer and infection. Microanatomy was represented on 24 of 31 weekly quizzes and all 6 module exams of phase 1.

**CONCLUSIONS**

This work describes the design and implementation of a clinically-relevant innovative phase 1 microanatomy curriculum that utilizes a normal vs. abnormal paradigm. One challenge to this approach was the lack of microscopic pathological specimens on glass slides, which left one component of the microanatomy education focused solely on normal histological structure. Future scholarship will explore the quality and efficacy of the approach described herein.

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## **A SURVEY ON THE DESIRE AND CURRENT STATUS OF NURSING CLINICAL EDUCATION CURRICULUM**

<sup>1</sup>-Hossein Karimi Moonaghi:assistant professor, University of Medical Sciences, Mashhad, Iran. <sup>2</sup>-Fatemeh Zoubin:master of nursing, University of Medical Sciences, Mashhad, Iran. <sup>3</sup>-Seid Reza Mazloum:lecturer, University of Medical Sciences, Mashhad, Iran <sup>4</sup>-Akbar Derakhshan:professor, University of Medical Sciences, Mashhad, Iran. <sup>5</sup>-Tahereh Binaghi:Teacher, Parvin High School, Mashhad, Iran. <sup>6</sup>-Maryam Akbari Lakeh:master of medical education, University of Medical Sciences, Mashhad, Iran.

### **PURPOSE**

Although it is believed that clinical education is the most important part of nursing education, research results assert that the quality of clinical education is not ideal. This study has done to identify the desire and current status of clinical nursing education curriculum in Mashhad Faculty of Nursing and Midwifery.

### **METHODS**

30 instructors, 130 bachelor nursing students, and 26 head nurses took part in this cross- sectional study. A researcher- made questionnaire was used for collecting data. For preparing the questionnaires, after reviewing literatures and detecting major criteria of desire status, 6 focus group interviews were conducted to determine the variables of each criterion. Afterward the validity and reliability of 3 questionnaires: 1) instructor (5 criteria, 81 statements), 2) student (5 criteria, 60 statements) and 3) head nurses (4 criteria, 61 statements), were confirmed and filled in by individuals who had the inclusion criteria.

### **RESULTS**

The 6 desire criteria of nursing clinical education curriculum (elucidation of position and importance of clinical education, complied and comprehensive course and lesson plan, qualified student, suitable environment condition and facilities, effective interpersonal relationship, and academic and clinical mutual relationship) were quite ideal. Competent instructor was "ideal" in head nurses' opinion and "quite ideal" in students' opinion.

### **CONCLUSIONS**

considering the fact that almost all of the major criteria were quite, reinforcement of positive aspects and improvement of negative aspects should be done in order to reach to desire status.

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## **TOWARDS INTEGRATING BASIC AND CLINICAL SCIENCES: OUR EXPERIENCE AT TOURO UNIVERSITY NEVADA**

Yehia M.A. Marreez, MD, PhD; Andrew Eisen, MD; Michael Wells, PhD; David Park, DO; Frederick Schaller, DO; Terrence Miller, PhD, Judy Turner, DO; Roy Krishna, PhD; and Lisa Rosenberg, MD  
College of Osteopathic Medicine, Touro University Nevada, NV 89014 USA

### **PURPOSE**

Integration of basic and clinical sciences has become imperative in medical education. However, the abrupt transition from a traditional to an integrated medical curriculum over the 4-years of medical school poses significant difficulties and is labor intensive. Therefore, we have adopted an innovative strategy to integrate basic and clinical sciences at Touro University Nevada College of Osteopathic Medicine.

### **METHODS**

Our integration strategy involves organizing a quarterly symposium series that targets 3rd and 4th year medical students. This series, titled "Integrative Medical Education Symposium (IMES), From the Molecule to the Bedside", involves up to two medical topics during each symposium. The choice of topics is decided by an IMES Committee according to rigorous criteria involving clinical relevance, diversity, prevalence, healthcare impact, and relevance to medical board exams. Topics are initially presented in a case-based manner, which is followed by an interactive discussion of the differential diagnoses. Discussion eventually results in a final diagnosis. In some cases, simulated patients were used to enhance students' interest and understanding. After the final diagnosis, basic scientists discuss the underlying basic science relevant to the topic. Clinicians then follow to discuss case management, emphasizing the link with basic science. Each student is required to provide an evaluation of the symposium. Although the IMES is not a course and students do not receive a grade, students doing clinical rotations and clerkships in Southern Nevada are required to attend.

### **RESULTS**

The average attendance is 130 students per symposium. Eighty five per cent of the students have provided positive feedback of the program with recommendations to continue, while just 15% have provided negative evaluations.

### **CONCLUSIONS**

The fourteen symposia delivered since 2007 have proven popular with third and fourth year medical students. We consider the symposia beneficial, as they have made students more aware of the importance of basic science integration with clinical medicine.

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**TOWARDS PATIENT SAFETY; IMPROVING AWARENESS OF CARE TRANSITIONS  
RELATED ISSUES AMONG MEDICAL STUDENTS**

Ugochi Ohuabunwa MD - Emory University Manuel Eskildsen - Emory University Jonathan Flacker - Emory University

**PURPOSE**

National medical education committees have identified care transitions as a core element of patient care and a critical component of health professional education, only 16% of internal medicine residency in the US programs have formal discharge curricula. Innovative methods of teaching are essential to equip future physicians for this critical aspect of patient care. We sought to develop an effective care transition curriculum.

**METHODS**

The care transitions curriculum was delivered to 4<sup>th</sup>-year medical students during their required inpatient medicine clerkship. The curriculum consists of group interactive sessions, web based sessions, web based learning exercises, experiential learning through direct patient care until discharge and a follow-up phone call.

**RESULTS**

There was an increased appreciation of care transitions related issues at a patient, provider and systems level as exemplified by these excerpts: 'The situation was scary because she had been receiving inadequate treatment and may have continued to if not for the call'. 'I think it's amazing how many of the call reports have some element of "I'm glad you called because the patient would not have known what to do" it definitely underscores that we should be doing this with all our patients to prevent bounce-backs and bad outcomes. I think it's especially important in a Grady-like population that is generally disenfranchised and in a system that is hard to navigate as the Grady health system is. Also, many of our Grady patients don't have PCPs and so there is a lag time between discharge and first PCP appointment when the only contact they have with the medical system is their hospital providers. It makes you realize that it's not just incidental that most of our patients have outstanding needs within a week after discharge'.

**CONCLUSION**

This curriculum represents an effective program to teach evidence-based transitional care.

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**DEFENSE AGAINST EXTRACELLULAR MICROBES-ASSEMBLING THE BIG PICTURE  
TOWARDS COMPETENCY IN IMMUNOLOGY**

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Paul L. Foster School of Medicine, El Paso, TX, 79922 U.S.A.

**PURPOSE**

The 2009 Scientific Foundations for Future Physicians Report of the AAMC-HHMI Committee recommends competencies that all medical students should demonstrate. An associated learning objective for competency M4, most related to immunology, states that students should be able to “Apply knowledge of the mechanisms utilized to defend against intracellular or extracellular microbes to the development of immunological prevention or treatment”. Yet medical students express frustration that they cannot assemble a comprehensive big picture for how the immune system builds an immune response against a microbe.

**METHODS**

A “big picture” diagram of an immune response against an extracellular microbe was prepared. As relevant parts were covered, students were given relevant sections of the diagram. Upon completion, students were provided with the entire diagram including numbered steps and explanations for each step.

**RESULTS**

While we feared the complete diagram might initially overwhelm the students, their responses indicated that they would prefer having the entire diagram upfront so that they might have it as an advance organizer for their study. They regarded the diagram as a valuable learning tool.

**CONCLUSIONS**

To fulfill the objectives recommended by the 2009 AAMC-HHMI Committee Report, students must first understand the big picture of how the immune system provides defense against microbes. Providing a “big picture” diagram facilitated student’s ability to understand defense mechanisms against extracellular microbes. This approach could be extended to also facilitate knowledge of defense mechanisms against parasites and intracellular microbes.

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**SCHOLARLY CONCENTRATIONS – A PROGRAM THAT FOSTERS SCHOLARSHIP AND STUDENT INDIVIDUATION**

Susan Pross, Ingrid Bahner, Roberta Collins and Alicia D.H. Monroe, College of Medicine, University of South Florida, Tampa, FL 33612

**PURPOSE**

Students enter our COM with a wide range of interests and talents. In order to foster individuation and promote scholarship, we initiated a Scholarly Concentration Program (SCP) five years ago. This abstract describes our experiences with the SCP, including its challenges and successes.

**METHODS**

The SCP consists of 10 concentrations overseen centrally by the Office of Educational Affairs. SCs include Business and Entrepreneurship, Health Disparities, Health Systems Engineering, Gender and Medicine, Medical Humanities, Law and Medicine, Medical Education, Public Health, International Medicine, and Research. In all, students meet regularly with SC leaders, develop relationships with faculty mentors, and complete capstone projects. SC leaders represent faculty from the COM as well as from Public Health. Each curriculum has commonality in terms of basic parameters and is reviewed by the curriculum committee. In all SCs, students are encouraged to do scholarly capstone projects and are mentored by faculty from USF Health, USF Colleges of Business and of Engineering, Stetson Law School, and local hospitals, including H. Lee Moffitt Cancer Center.

**RESULTS**

There are 290 students enrolled in the SCP. Their capstone projects have incorporated basic science research, clinical studies, education and service. Students have presented their work locally and nationally. The breadth of the SCP is seen in students studying engineering principles for patient safety, advancing care for the underserved, creating artistic works, and developing educational experiences and curriculum.

**CONCLUSION**

Our SCP has attracted a majority of students at the COM. Specifics of the SCP, including tools to track student progress and assess the program as well as student reflections on their experiences will be presented.

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**DEVELOPMENT OF A FULLY INTEGRATED ONE SEMESTER BASIC SCIENCE COURSE FOR THE M1 YEAR**

Wanda C. Reygaert, Robert A. Augustyniak, Mary T. Bee, Craig T. Hartrick, David W. Rodenbaugh, Richard L. Sabina. Oakland University William Beaumont School of Medicine, Rochester, MI, USA.

**PURPOSE**

The Oakland University William Beaumont School of Medicine is a new medical school with a curriculum based on integration of basic and clinical sciences. The introductory material for the basic sciences is to be delivered during the Fall semester of the M1 year. We have developed a curriculum for that semester that integrates all of the basics sciences across the course.

**METHODS**

Six members of the basic science faculty, designated as Discipline Directors for their respective basic science, collaborated in the design of the integrated Basic Foundations of Clinical Practice (BFCP) course. This process took place over the past 18 months, and included input from the other Discipline Directors, other subject content experts, advice from educational consultants, and faculty development seminars.

**RESULTS**

The completed course design represents a new type of integrated curriculum for the basic sciences. Introductory material from all of the basic sciences (Anatomy, Biochemistry, Cell Biology, Embryology, Genetics, Histology, Immunology, Microbiology, Molecular Biology, Pathology, Pharmacology, and Physiology) is integrated across the one semester course. The course content includes traditional and interactive lectures, laboratory experiences, and active learning components such as Team-Based Learning (TBL) modules.

**CONCLUSIONS**

We have shown that it is possible to develop an introduction to the basics sciences that can be delivered in a one semester course. We have also shown that integration of the basic sciences across this course is possible. Our hope is that this will allow us an opportunity to provide active learning experiences that will fully engage the students and help them to better comprehend the material. This should also help the students to be able to better incorporate this knowledge of the basic sciences into their total medical education experience.

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**DESIGN AND IMPLEMENTATION OF A CAMPUS-WIDE ETHICS CURRICULUM AT AN ACADEMIC HEALTH SCIENCE CENTER**

William E. Seifert, Jr., Irmgard U. Willcockson, Nathan Carlin, Catherine M. Flaitz, and Jeffrey P. Spike, The University of Texas Health Science Center at Houston, Houston TX, 77030 U.S.A.

**PURPOSE**

The purpose of this project was to design, implement and ensure the long-term continuation of an ethics curriculum among the six schools (medicine, dentistry, nursing, bioinformatics, public health, biomedical sciences) of The University of Texas Health Science Center at Houston (UTHealth). The goal was to enhance student learning of ethics and professionalism in all six schools using an interprofessional approach. This abstract describes the project and its progress to date.

**METHODS**

In 2009, after institution-wide discussions, meetings, focus groups, a survey and a request for proposals, UTHealth chose to improve ethics education using an interprofessional approach as its quality enhancement process. A campus-wide ethics program committee was formed from faculty representatives of all six schools. It met semimonthly for the first year to assess how ethics was taught in each school and where additional interventions might be fruitful, for faculty development in clinical and research ethics, and to develop the strategies for implementation and assessment of the project.

**RESULTS**

A series of three online modules on ethics for all students early in their career at UTHealth is currently under development. It will include scenarios that challenge students to address an ethical dilemma from multiple professional perspectives. A second intervention is a just-in-time module targeted at graduate students beginning their degree-related research. It contains content related to ethics in research and publication.

**CONCLUSION**

Using an inclusive model of faculty participation has led to increased engagement with an interprofessional curriculum. Components to address the different needs of professional and graduate students have been identified and are under active development.

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**THE EFFECTS OF A PRE-CLINICAL GERIATRICS CURRICULUM ON ATTITUDES TOWARDS AND COMPETENCY IN GERIATRIC MEDICINE**

Asha Talati, BA, Elizabeth O'Toole, MD Case Western Reserve University, Cleveland OH

**PURPOSE**

To assess the impact of a pre-clinical geriatrics curriculum on second year medical students in the areas of (1) knowledge of common conditions affecting geriatric populations and considerations for assessment and care; (2) attitudes towards geriatric populations and medicine; and (3) awareness of the psycho-social considerations to care of older adults.

**METHODS**

Cohort study of volunteering MS2 students immersed in a six-week geriatrics curriculum. Students met twice per week for the following activities: (1) focus group sessions discussing clinical and personal experiences with older adults; (2) interactive group sessions with geriatric specialists; and (3) shadowing activities with volunteering physicians and geriatric patients. Students were surveyed regarding interest in geriatrics and examined using a geriatrics knowledge test pre-and post intervention. Students participated in focus group sessions weekly that were recorded and analyzed using ground theory methodology

**RESULTS**

The study is currently on-going. Pre-intervention geriatric interest survey results show that only 20% of students agree with the statement "I understand the unique issues involved in care for the elderly and 10% of students reported that they are interested in pursuing a career in geriatrics. Pre-Intervention use of the Geriatrics Knowledge Test showed scores ranging from 39% to 67% with a mean score of 48% (sd = 9.3%)

**CONCLUSIONS**

Pre-intervention survey and test results suggest inadequate foundations in and exposure to geriatric medicine during the pre-clinical medical school curriculum. Initial analyses of focus group sessions have suggested that the use of an interactive lecture and experiential learning based curriculum in geriatric medicine has increased (1) comfort working with older persons; (2) awareness of the unique aspects of care of the older adult; and (3) interest in pursuing geriatric medicine. We expect survey and UCLA geriatrics knowledge test results to rise concomitantly.

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**DEVELOPING AN EVIDENCE-BASED BIOMEDICAL SCIENCE CURRICULUM FOR UNDERGRADUATE MEDICAL STUDENTS**

Stephanie Bull, Nick Toms and Karen Mattick. Peninsula College of Medicine & Dentistry, University of Exeter, Exeter, EX1 2LU, UK

**PURPOSE**

Recent decades have seen learning outcomes assume a central role in directing the content of medical education programmes. Many factors have driven this change, perhaps the most important of which has been a desire to formally and systematically ensure the competence of healthcare professionals. Under this new paradigm, the way in which learning outcomes are identified becomes a crucial priority. This poster reports an empirical approach used to identify the biomedical science content which should be included in an undergraduate medical programme. Specifically, we considered what biomedical science do junior doctors use?

**METHODS**

We used a mixed-methods approach, combining the deep insight provided by stimulated-recall interviews and task-group narratives, with the numerical information provided by card sorting exercises. The participants were junior doctors employed at six different hospitals in South West England.

**RESULTS**

The data from the stimulated-recall interviews showed that science was rarely mentioned in relation to the decisions that junior doctors have to make. On the other hand, the card sorting exercises suggested that 483/632 (76%) of the biomedical science learning outcomes had been used in the first year of clinical practice.

**CONCLUSIONS**

This apparent contradiction highlights the importance of methodological choices: inappropriate conclusions could be drawn from one data set alone. The study suggests that during early clinical practice students rely heavily on their biomedical science knowledge; against this background, it is striking that this knowledge appears to be latent and seldom verbalized.

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**REVITALIZATION OF A TRADITIONAL PHARMACOLOGY COURSE THROUGH CLINICAL INTEGRATION AND VARIED PEDAGOGY**

Donna Weber, PhD, Robert Hadley, PhD, David Rudy, MD, Michael Piascik, PhD, College of Medicine, University of Kentucky, Lexington, KY 40536

**PURPOSE**

Provide a multifaceted approach to a lecture based medical pharmacology course through carefully selected clinical context and pedagogy. Goals of this transition: 1) reinforce the foundational concepts of pharmacology through focused clinical applications 2) engage the millennial learner through structured and varied pedagogy & 3) encourage knowledge construction built on foundational concepts, application of knowledge & utilization of new information to create new constructs.

**METHODS**

Key clinical & basic science faculty were identified. Instructional methods were selected to complement the curriculum & the student population. Specific didactic lectures were replaced with: 1) Clinical case discussions explicitly focused on pharmacology learning objectives to form a rational therapeutic approach. To ensure student preparation a quiz via audience response system (ARS) occurred with the discussion. 2) Team-based learning (TBL) exercise with readiness assessment & clinical application of this knowledge. 3) Interprofessional experience (IPE): 4 person team of medical, pharmacy and nursing students interviewed, admitted and discharged a standardized patient (SP). All orders & documentation for each profession were prepared by each team. 4) Routine integration of the audience response system (ARS) into foundational lectures (formative, not graded) 5) guided learning modules with on-line quizzes & summative exams complemented these revisions.

**RESULTS**

The results from student & faculty assessments will be analyzed and presented for each pedagogy. Objective (exam item analysis) & subjective measures will be included.

**CONCLUSIONS**

Dedicated and creative biomedical educators who work cooperatively across professional disciplines to bridge basic & clinical science were essential to this endeavor. Varied pedagogies permits greater depth of student comprehension, spanning beyond knowledge acquisition to patient care, interpersonal & communication skills, practice and system based learning.

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**DECISIONS, DECISIONS. HOW ARE CLINICAL DECISIONS MADE, AND HOW SHOULD THEIR PROCESS BE TAUGHT?**

Crawford Winlove and Karen Mattick Peninsula College of Medicine & Dentistry, University of Exeter, Exeter, EX1 2LU, UK

**PURPOSE**

The education community has shown a growing interest in cognitive neuroscience. This poster reviews how decisions are made and investigates whether enhanced training in decision-making skills is practicable, or likely to enhance clinical practice

**METHODS**

Published literature was discussed by the authors and members of their research group.

**RESULTS**

All 12 student responses were included in results. Before completing TeachLP, student-reported comfort in performing an LP was 1.9 on a 5 point Likert scale (median and mode of 1). 11/12 desired an opportunity to learn. Average pre-test knowledge score was 68%, with poor safety knowledge. After completing TeachLP, student-reported comfort in LP performance doubled to 3.9 (5 point scale; median and mode of four), and all stated the training was beneficial. Knowledge test scores also improved an average of 25%, from 13.58/20 pre-test to 18.65/20 post-test. Safety knowledge improved most. Procedure checklist also reflected competency.

**CONCLUSIONS**

There's an urgent need to understand the cognitive processes underlying adaptive decision-making. There is some evidence that improved decision-making is a key feature of expert clinical practice. A challenge for educationalists is to develop curricula that develop students' veridical and adaptive decision-making skills. A course which prioritised such skills, and supported their development through aligned assessment, could redefine medical education.

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**HOW SCIENCE IS USED IN CLINICAL PRACTICE: A LITERATURE REVIEW**

Karen Mattick, Richard Ayres, Kevin Brandom, Faith Budge, Stephanie Bull, Nicola Brennan, David Bristow, Sarah Edwards, Alice Miller, Sam Regan de Bere, James Read, Nick Toms and Crawford Winlove. Peninsula College of Medicine & Dentistry, University of Exeter, Exeter EX1 2LU, UK.

**PURPOSE**

An understanding of science is considered essential for doctors but it is unclear if science education in undergraduate programmes prepares students effectively for medical careers. We investigated how science is used in contemporary clinical practice. This is a first step in determining how effectively an undergraduate education prepares students for practice.

**METHODS**

3 systematic reviews were undertaken, with search terms identified through debate and literature analysis. PubMed, Web of Knowledge, EMBase, PsychInfo, CINAHL & Swetswise were searched for papers published between 1996-2010 in English. The inclusion criteria were a focus on: the purpose, utility or role of science; the scientific knowledge that underpins clinical practice; science as a cognitive process. 3267 papers were screened and 44 included in the review. Data were extracted independently by at least 2 people using a standard form.

**RESULTS**

Only 21 of the 44 papers reported empirical research. Despite a broad definition of the term 'medical science', the vast majority of papers were concerned with the biomedical sciences. Whilst we identified 5 main ways in which doctors use science, only one of them - science as a knowledge base - had substantial empirical support.

**CONCLUSIONS**

There is surprisingly little evidence that supports science teaching being an important component of undergraduate medical education. Too little is known about why we teach science and what sciences to teach. Whilst it seems that scientific knowledge and an understanding of disease mechanisms are important, this requires objective evaluation. The additional roles of science we have identified through this study, for example in logical reasoning & managing uncertainty, have a similarly urgent need for investigation.

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## **MEDICAL STUDENT FEEDBACK ON PARTICIPATING IN EITHER A PROSECTION ONLY OR A PROSECTION FOLLOWED BY DISSECTION ANATOMY CURRICULUM**

Paul Rabedeaux<sup>1</sup>, Seth D. Lerner<sup>1</sup>, Paul Wimmers<sup>1</sup>, Craig Byus<sup>2</sup> and Jonathan J. Wisco<sup>1</sup>, <sup>1</sup>David Geffen School of Medicine at UCLA, Los Angeles, CA 90095, U.S.A., <sup>2</sup>UCR/UCLA Thomas Haider Program in Biomedical Sciences, Riverside, CA, 92521, U.S.A.

### **PURPOSE**

At the David Geffen School of Medicine at UCLA, 1st year students have the opportunity to volunteer in a summer dissection program after completing the prosection-based anatomy course. In this study, students who completed prosection only and students who completed both prosection and dissection were asked about their experiences and their perception of the value anatomy has in the medical curriculum.

### **METHODS**

As part of a longitudinal study, we conducted the first of seven annual surveys, with Likert-style questions and free responses of 2nd through 4th year medical students at the David Geffen School of Medicine at UCLA/Charles R. Drew University (CDU) of Medicine and Science, inquiring about themes on choice of program, skill training, learning methodologies and curriculum recommendations.

### **RESULTS**

Out of 450 surveys distributed, 90 students responded, of which 42 participated in the summer dissection program. These students regarded both pedagogies highly, but expressed that prosection allowed for learning of semantics while dissection promoted reinforcement of knowledge and was a better preamble for surgical training. Responses from both cohorts on the value of anatomy were categorized into, and were equally distributed amongst the following themes: Anatomy is 1) the basis for medical understanding, 2) part of the overall medical school experience, 3) a bridge to understanding pathology and physiology, 4) the foundation for clinical skills.

### **CONCLUSIONS**

Medical students who learned anatomy through prosection and then dissection perceived their experience as more complete with regard to initial learning and reinforcement. However, all students equally valued the role of anatomy in the medical curriculum. This study was approved with an IRB exempt protocol.

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## **THE IMPACT OF MEDICAL SCHOOL ON STUDENT MORAL REASONING AND EMPATHY**

John George, Ph. D.(ATSU/KCOM), Susan Coon, MA(ATSU/KCOM), Melanie Davis, MA(ATSU/KCOM), Stephen Laird, D.O.(ATSU/KCOM)

### **PURPOSE**

A study of 641 medical students across four years of medical school determined that there were significant changes in moral reasoning scores and subscale scores of self-interest, maintaining norms, and antisocial (cynicism) as measured by the Defining Issues Test -2 (DIT). During medical school the students' N2 scores dropped while their antisocial scores rose. These changes were correlated with a decrease in their empathy scores as measured by the Barrett-Lennard Empathy Scale. This study demonstrates a need for addressing the hidden curriculum in the didactic years or face the outcome of less tolerant and empathic medical school graduates.

### **METHODS**

KCOM administered the Defining Issues Test (DIT-2) and assessed empathy using a modified Barrett-Lennard Scoring Instrument to 172 medical students annually during end of year testing for 3 consecutive years. Students' responses were evaluated to measure their overall moral reasoning score (N2) and subscales; personal interest, antisocial, and maintaining norms. Students' empathy was measured through a modified Barrett-Lennard scale. Standardized patients rated the students' ability to demonstrate empathic behavior during end of year assessment. Inter-rater reliability for Standardized Patient encounters was 0.88 for Empathy Evaluation.

### **RESULTS**

Using Sigma Plot program results showed significant differences between male and female students' scores on each of the variables. Significance was noted between males and females for maintaining norms in their third year of school and in personal interest for the class, both with a p value of 0.03. There were statistically significant differences between males and females on the antisocial and N2 scores with p values of < 0.003 and <0.001 respectively for all three years. Results demonstrated that students enter medical school with higher self-interest scores and the two scores are comparable to the established norms; however the antisocial scores rose significantly in the second year and plateau during year 3.

### **CONCLUSION**

DIT-2 and empathy scores show similar patterns indicating that medical students are able to compartmentalize and postpone cognitive moral development rather than continue development of moral reasoning as shown by other professions. The sub-scales indicate students' self-interest rises in year two and decreases by the end of their third year of medical training. Antisocial scores increased in year two. Results document the impact the second year curriculum has on moral development. Overall, the stress medical students experience because of the curriculum results in lack of continuing moral development, but does not impact their empathy.

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**MEDICAL STUDENTS WITH ADHD**

Pamela O'Callaghan, Robert Gee and Davendra Sharma, Ross University School of Medicine, Dominica, West Indies.

**PURPOSE**

Medical schools in the US are expanding enrollment and preparing for an emerging population of disabled students. Therefore, it is imperative that we understand the obstacles these students face and prepare to meet their needs in order to provide diversity in the field of healthcare providers. Students with ADHD in the first two years of medical school were surveyed in order to answer the following questions: What is the level of functional impairment in medical students diagnosed with ADHD? What are successful study techniques employed by medical students with ADHD? And, what is the greatest challenge faced by medical students with ADHD?

**METHODS**

The following instruments were completed by 30 medical students diagnosed with ADHD: the Adult ADHD Quality of Life Scale (AAQoL), the Adult ADHD Self-Report Checklist (ASRS) and a questionnaire in which student are asked to describe successful study techniques and the challenges they face in medical school.

**RESULTS**

Findings include positive correlations between severity of ADHD symptoms and functional impairment, the presence of co-morbid conditions and functional impairment, while the use of support services is negatively correlated with functional impairment. Qualitative data was analyzed by categorizing student responses based on areas of executive function impairment in adult ADHD. Time management was reported as the greatest challenge to students.

**CONCLUSION**

Medical students that seek help in the form of academic and or psychological counseling report a lower level of functional impairment related to their ADHD. Further research is needed to develop specific interventions to support medical students with ADHD.

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**LEARNING PRINCIPLES AND ASSOCIATED STRATEGIES RELEVANT TO MEDICAL EDUCATION**

Norma S. Saks and Maris F. Cutting, UMDNJ-Robert Wood Johnson Medical School, Piscataway, NJ 08512 U.S.A.

**PURPOSE**

To provide medical educators with relevant principles of learning and associated strategies to guide instructional and assessment decisions, student learning, and academic support.

**METHODS**

Using our knowledge as educational psychologists and medical educators with over 30 years of experience providing academic support, we selected principles of learning particularly relevant to medical education. Learning principles were selected to maximize the learning environment to enable efficient and effective learning. We have related each principle to specific strategies for faculty who plan instruction/assessment, for students studying medicine/health professions, and for guiding those who provide academic support.

**RESULTS**

The following learning principles with accompanying strategies were selected as most applicable: spaced practice and cumulative review (distribution of study over time), testing effect (benefit of self assessment and frequent testing), organization effects (strategies for integrating and synthesizing content material), self-regulation of learning and metacognition (planning, monitoring, and evaluating one's own learning), exam expectations (influence of cumulative exams on recall), desirable level of difficulty (material structured to promote effortful learning), explanation effects (the role of deep questions and explanations in facilitating understanding), cognitive flexibility (problems and cases that vary in content and complexity), and anchored learning (learning in context).

**CONCLUSIONS**

These principles of learning can provide guidance to medical students and faculty engaged in medical education. They offer structure to stimulate discussion, to facilitate learning, instruction, and assessment, and to guide academic support.

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**FUNDAMENTALS-I: AN INTEGRATED BASIC SCIENCE COURSE FOR FIRST-YEAR MEDICAL STUDENTS**

Laura F. Cotlin, Dept. of Cell Biology, University of Alabama at Birmingham, Birmingham, Alabama, 35294 U.S.A

**PURPOSE**

In 2007, the University of Alabama School of Medicine implemented a new curriculum, transitioning from a traditional discipline-based curriculum to an integrated organ-based curriculum for the basic science content. This called for an introductory course that covered the disciplines of biochemistry, genetics, physiology, cell biology and histology, and was later expanded to include anatomy and pharmacology. This abstract describes the development of the Fundamentals-I course since its inception.

**METHODS**

In developing Fundamentals-I, instead of organizing content based on discipline designations, content was organized and grouped under one of the following subheadings: human anatomy, bioenergetics, building blocks, flow of genetic information, cellular organization and mechanisms, tissue integration, and drug interactions. In addition to basic scientists, clinical faculty were recruited to participate in the course as well, allowing for integration of core concepts with clinical medicine. For example, anatomy content was augmented with sessions on radiology, surgical anatomy and emergency medicine. In addition to traditional lectures, material was covered in activities such as laboratories, large group workshops, and small group meetings.

**RESULTS**

After four years, the Fundamentals-I course has evolved to cover the structural, genetic and biochemical basis of human cell biology and physiology, including the application of these disciplines in clinical medicine. There are current 45 faculty participating in the course, with approximately one-third of those being clinical faculty. The course has consistently been rated high among first-year courses and is well-received by both students and faculty.

**CONCLUSION**

Fundamentals-I covers an overview of the anatomical structure of the organ systems and the basic tissues types, which in turn are the framework for exploring the mechanics of the human body. By correlating normal molecular and functional aspects of cells and tissues with their structural organization, students acquire base knowledge for understanding human diseases throughout the subsequent organ-system modules.

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**AN INTEGRATIVE, MULTI-ORGAN SYSTEM APPROACH TO TEACH HOMEOSTASIS**

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Cleveland, Oh 44106 Amy L Wilson-Delfosse Case Western Reserve Medical School 10900 Euclid  
Avenue Cleveland, Oh 44106

**PURPOSE**

Many U.S. medical schools are engaged in curriculum reform. Integration of normal and abnormal physiology is becoming more common but most schools still present organ systems in an isolated fashion. One goal of the Western Reserve2 (WR2) Curriculum at Case Western Reserve School of Medicine is to put learning of the basic sciences into realistic clinical contexts that include simultaneous consideration of multiple foundational sciences at one time.

**METHODS**

A "Homeostasis" course was developed that integrated normal and abnormal pulmonary, cardiovascular and renal physiology, and principles of pharmacology and cell physiology. Learner-centered teaching methods were utilized to promote skills of self-directed learning and inquiry. Successful integration was evaluated by survey of student opinion. Faculty perceptions of student learning are currently being collected from pre-clerkship and clerkship teaching faculty.

**RESULTS**

Results: All students (n=158) were required to complete end of course surveys. In addition to other questions, students were asked to rate the extent to which cardiovascular, pulmonary, and renal physiology, cell physiology and pharmacology were integrated in the course and enriched their understanding. Using a Likert scale of 1(poor) to 5(excellent), mean scores for each discipline area were as follows: Cardiovascular, 4.5; Pulmonary 4.3; Renal 4.6; Cell Physiology 3.9; and Pharmacology 3.1.

**CONCLUSIONS**

Students expressed positive opinions about integration of the three organ systems and cell physiology. Pharmacology was rated somewhat lower, perhaps due to challenges of presenting principles of pharmacology in a truly integrative and longitudinal fashion. Faculty perceptions are forthcoming.

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**IMPLEMENTING A PRECLINICAL ONCOLOGY CURRICULUM TO PREPARE MEDICAL STUDENTS FOR TREATING CANCER PATIENTS**

Nicholas J DeNunzio, BS, Ariel E Hirsch, MD

**PURPOSE**

It is estimated that over one third of women and a near majority of men in the United States will be diagnosed with cancer in the course of their lifetimes. To prepare future new physicians for this reality the authors have constructed a pre-clinical oncology curriculum that introduces second-year medical students to essential concepts and practices in oncology and that is based on a model that is currently employed by their home Institution. Its intent is to improve students' comfort with the material prior to seeing patients as well as improve their abilities to appropriately interact with these patients.

**METHODS**

The authors compiled a list of subjects deemed important to educate students about after having consulted the oncology and medical education literature. Topics vary greatly, including basic science and clinical aspects of oncology as well as those that address patients' psychosocial needs, but all included areas fulfill at least one of the competencies prescribed by the Accreditation Council for Graduate Medical Education for structuring content in residency programs.

**RESULTS**

The authors address practical considerations for curriculum implementation and non-traditional learning formats like self-studies and case discussions along with proposing a traditional but systematic lecture schedule. Other points of consideration are integration with a school's existing academic calendar, state-of-the-art concepts and technologies in cancer patient care, and providing institution-specific flexibility in discussing some topics.

**CONCLUSION**

The evolving oncology healthcare landscape necessitates that all (new) physicians be competent in holistically managing their cancer patients' conditions, regardless of area of specialization. Implementing a thorough and logically organized cancer curriculum for pre-clinical medical students, with inputs from the national medical community to improve it, should help achieve these aims.

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**A MODEL OF INTEGRATING EMERGENCY ORTHOPEDICS TO ANATOMY CURRICULUM FOR MEDICAL STUDENTS: HIP JOINT AS AN EXAMPLE OF LOWER EXTREMITY COURSE**

Marreez, YM. Touro University Nevada

**PURPOSE**

Medical curricular integration is moving in steady steps. Unlike other basic medical sciences, anatomy is a distinct course that has its own specifics regarding efficient integration. Anatomy integration in a system-based curriculum without losing some learning quality is inevitable. However, strategic planning of the process would dramatically improve the learning quality of anatomy. In other words, a favorable way to understand anatomy is to integrate suitable surgical topics complemented by simulated hands-on practice for the first and second-year medical students. In this work, we propose a curricular-sample design towards integrating emergency orthopedics with anatomy.

**METHODS**

Hip joint is used as a model for this study. Hip region anatomy is fully discussed followed by discussion of common anatomopathological hip lesions and their management. For example, hip joint may subject to traumatic posterior dislocation. Underlying disturbed anatomy of the region and potential risks are analyzed. Reasoning of emergency intervention and management to restore normal anatomy are explained. Besides gross lab practical, hands-on practice of the maneuver to restore normal hip on manikins or anatomy simulators can be introduced. Same plan can be applied to other body regions.

**RESULTS**

A reasonable and controllable integration of anatomy and emergency orthopedics would be expected to improve acquaintance and reinforce learning objectives of anatomy for early-year students. This approach would minimize redundancy and arduousness in retaining voluminous anatomical information, particularly if learning process involves parallel hands-on application.

**CONCLUSIONS**

Anatomy is compatible with emergency and surgical specialties. Carefully designed integration would move anatomy curriculum to a higher level of interest and significance.

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**HIGHLIGHTS OF THE FIRST ITERATION OF A NOVEL, INTEGRATED 10 SUBJECT YEAR 2 MEDICAL SCHOOL COURSE**

Brad G. Clarke and Anne G. Minenko, University of Minnesota Medical School(UMN), Minneapolis, MN 55455 USA

**BACKGROUND**

Current LCME standards require coordination and integration of content within and across periods of study. (ED33)

**PURPOSE**

To describe a new 10 week integrated 10 subject 2nd year UMN Medical School course, Human Disease 2 (HD2), and its preliminary outcomes.

**METHODS**

Previously dominated by content centered didactic instruction, Neurology, Psychiatry, Orthopedics, Dermatology, Eye, ENT, and Rheumatology were assigned to HD2. Related Infectious Diseases, Pathology and Pharmacology threaded through the four Year 2 HD Courses. An HD2 Faculty Course Director (CD) led course design/ development and interfaced with the HD2 Course Manager/ Office of Education. Subject specific development was decentralized to 10 departments involving 100+ instructors. Related topics were organized into "theme weeks" e.g. sleep & snoring week, introduced by and ending with integrated multiple choice self- assessments. Syllabus, reading/ class materials, formative assessments (FA) were organized on a password protected UMN supported Moodle course management system. Three half-days per week of preparatory Independent Learning Time were mandated. Active learning was highly promoted.

**RESULTS**

Of 171 students, 97% and 93% passed the composite single subject (71 question) and integrated (31 question) final exam, respectively. Quality of integrated/ application take home assignments completed by student teams exceeded expectations. Attempt counts showed formative assessments were used as pre-exam study tools. Several innovative interactive activities were developed; many faculty now collaborate on projects outside of HD2.

**CONCLUSIONS**

This first iteration of HD2 shows the potential feasibility, effectiveness and added value of a complex integrated multi-subject 2nd year Medical School course. 1. Standards for Accreditation of Medical Education Programs Leading to the M.D. Degree, June 2010, [www.lcme.org](http://www.lcme.org).

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**LESSONS LEARNED ABOUT INTEGRATING A 'SILO' COURSE INTO AN EXISTING INTEGRATED CURRICULUM**

Kerstin Honer zu Bentrup, Tulane University Medical School, New Orleans, LA 70112, USA

**PURPOSE**

Integrated curricula have become the norm in Medical schools. Curricular integration typically refers to interdisciplinary block courses in pre-clerkship years that bring together basic and clinical sciences into one course (horizontal integration), or weave curricular themes across the curriculum (vertical integration). We describe the process of revising a Medical Microbiology course curriculum, in order to integrate the course into an existing Systems curriculum.

**METHODS**

- Review of literature to identify common problems to be anticipated with curriculum integration
- Identify and discuss major hurdles perceived by teaching faculty to be obstacles toward successful integration
- Encourage select lecturers from different disciplines to coordinate and team-teach their sessions, preferably as active learning
- Coordinate with evaluation specialist from OME to set up evaluation forms for newly structured course to be able to compare with recent years..

**RESULTS**

Using the "IDSA Guidelines for Improving the Teaching of Preclinical Medical Microbiology and Infectious Diseases" we devised a new course structure including a two-week basic principles block, taught by just one teacher to achieve a more unified teaching environment, and lectures taught by content experts throughout the systems blocks.

**CONCLUSIONS**

To achieve 'real' integration, a close collaboration from all teaching faculty in the various disciplines is needed. This project will need several years of 'tweaking' to reach the goal of integration. We are at the beginning of this process and think that now we just have to implement our new curricular module and use course evaluation data to guide us in improvements of the course in years to come.

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**DEVELOPING AN INTERPROFESSIONAL CURRICULUM IN AN ONLINE SETTING:  
LESSONS LEARNED ALONG THE WAY**

Danielle L. Lusk, PhD Jefferson College of Health Sciences

**PURPOSE**

In the Institute of Medicine's Health Professions Education: A Bridge to Quality report (Greiner & Knebel, 2003), a need for interprofessional teamwork as part of the educational curriculum was noted. JCHS is creating an interprofessional education (IPE) program to meet these requirements while dealing with the logistical challenges that arise with IPE. In addition to the challenges within IPE, there are also the challenges of teaching teamwork in an online setting.

**METHOD**

JCHS is developing three IPE courses that will focus on interprofessional teamwork. The courses will be delivered primarily online and will focus on skills, attitudes, and knowledge needed to work as a member of an interdisciplinary team. The first course, Fundamentals of Teamwork, is currently in development. It is this course that will be the focus of the poster presentation. The committee developing the course is, itself, learning how to work in an interprofessional team while creating the curriculum for the course. The course will also be taught in a distance format, which creates more logistical challenges for the curriculum team.

**RESULTS**

This is a work in progress. The curriculum for the first course is in development and will be piloted in May before being implemented in Fall 2011. However, the faculty developing the course are learning valuable curriculum and teamwork lessons along the way.

**CONCLUSION**

Lessons learned from working to develop the curriculum include (a) a need for a common language, (b) a need for a common schedule to develop the curriculum, (c) the need to set appropriate guidelines, (d) how discussing professional and personal expectations of a course and compromising with others creates community, and (e) the need for developing an appropriate faculty development program to address the unique challenges presented by an interprofessional curriculum. Additionally, results from the May pilot will be shared in the poster presentation as to how well students did with the curriculum and the students' feedback on the first course.

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## **DESIGN CAN IMPROVE USE AND SATISFACTION OF ONLINE CURRICULA**

Rhett Butler<sup>1</sup>, Marvin Nieman<sup>2</sup>, Peggy Kim<sup>1</sup>, Amy Wilson-Delfosse<sup>3</sup>  
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<sup>2</sup>Department of Medicine, Division of Hematology/Oncology, Case Western Reserve University School of Medicine, Cleveland, OH  
<sup>3</sup>Department of Pharmacology, Case Western Reserve University School of Medicine, Cleveland, OH

### **PURPOSE**

Educational institutions are creating web-based curricula. Despite this trend, education research journals reflect a paucity of design efforts in online curriculum development. Research regarding the benefits of online design has surged within commercial journals concomitant with public internet use. The purpose of this study is to determine the influence of implementing commercial design principles on utilization and satisfaction in a medical education setting.

### **METHODS**

The Case Western Reserve University School of Medicine curriculum includes optional online pharmacology modules (PharmWeb), created to introduce medical students to pharmacology vocabulary and principles. The design of PharmWeb was modified, taking advantage of the business principles of improved usability and accessibility. Utilization of the modules was compared between classes before and after the redesign intervention. Voluntary surveys and module hits were used to evaluate the intervention.

### **RESULTS**

After the design interventions, 33% (95% CI: 0.14, 0.52;  $p=0.0043$ ) more students accessed modules from an average of 49% to 82%. While the access rate of the pre-intervention group declined over time (from 58% to 36%), post-intervention access was maintained ~90% throughout the study period. Survey data showed a significant ( $p=0.0063$ ) increase in pharmacology education satisfaction.

### **CONCLUSIONS**

The benefit of web design in commercial applications was successfully applied to our online curriculum. This redesign intervention significantly increased regular utilization and satisfaction of a voluntary, self-directed curriculum. These results suggest that educational institutions with coherent design philosophies will benefit from an additional, effective means of pedagogy.

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## **INSTRUCTING GENERAL PRACTITIONER TRAINEES BASIC PRACTICAL SKILLS USING STREAMING VIDEO**

Alien W. Riedstra, Paul P.M. Jonas, Peter G.M. de Jong, Leiden University Medical Center, The Netherlands

### **PURPOSE**

Performing basic practical skills is a common part of the General Practitioners' job. Physicians have learned these skills during rotations in the medical school curriculum, yet they lack routine experience. There is also a risk that young physicians acquire incorrect habits due to a lack of supervision. Proper training of these skills is therefore an important part in the first year of training of General Practitioners at the Leiden University Medical Center (LUMC).

### **METHODS**

31 videos have been developed, illustrating the most common basic medical examinations for GP's, like inspection of the joints, spine, eyes, lungs, abdomen as well as internal and external genitals. For privacy reasons, these videos are offered to the trainees in a secure online environment using Blackboard and the Dutch Surfmedia platform. Only first year trainees and their trainers are entitled to watch these videos.

### **RESULTS**

At the time of writing this abstract, the videos are used in education by 100 trainees and trainers for 6 months. The videos on inspection of the lungs, knees and eyes as well as measuring arterial blood pressure are most popular (over 100 views per video). Trainees as well as trainers are enthusiastic about the educational approach of the videos. They state the videos reflect the warmth of the small GP setting, compared to a usually more distant hospital setting. Unfortunately, we did not yet succeed in offering the videos exclusively accessible to first year trainees only. Technically this is possible but the practical downside of this procedure has prevented us from using this option.

### **CONCLUSION / FUTURE DIRECTIONS**

At this time only LUMC trainees use the videos. We plan to make these series of videos also available to other University Medical Centers in the Netherlands. Furthermore we will investigate other secure online environments to offer video files for specific target groups.

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## **'FACTORS ENHANCING OR INHIBITING STUDENT'S COLLABORATIVE LEARNING IN THE ONLINE LEARNING ENVIRONMENT'**

Dubi, Aweke Y. School of Nursing & Midwifery College of Medicine & Health Sciences Hawassa University Ethiopia

### **PURPOSE**

The development of communication and information technologies together with changes in both the educational environments and the nature of students have motivated the educational community to search for flexible methods of course delivery in higher education and computer supported online collaborative learning is the most promising idea to improve teaching and learning together with the modern information and communication technology. Collaborative learning refers to an instructional method whereby students are encouraged to mutual engage in a coordinated effort to solve a problem together or to acquire together new knowledge. In the distance part of the MHPE program students communicate and collaborate mainly through a web-based application system called blackboard or discussion board for a major part of the course work. It was, however, unknown whether the distance part of the MHPE program was able to sufficiently support the online collaborative learning activities of the students. Hence, the purpose of this study is to investigate the factors that enhance or inhibit students' collaborative learning within the distance part of the MHPE program in the students' opinion.

### **METHODS**

The study was conducted in the School of Health Professions Education at University of Maastricht on the distance part of the MHPE program. Twenty-one 2007-2009 and 2008-2010 cohorts MHPE students have participated in the study. An electronically mailed Likert-type questionnaire that address the different aspects of distance based MHPE program: the cognitive aspect of the distance based program, the affective aspects of the distance part of the program, EleUM, overall aspect of the distance MHPE program and suggestion for improvement was sent to students' personal email address. Data was analysed using descriptive statistics (mean, standard deviation and percentages) to investigate and describe the opinion of students for the different aspects of the distance based MHPE program. Data obtained from the open-ended questions was categorized by themes to gain a more comprehensive understanding of the students' opinion.

### **RESULTS**

The results of this study demonstrated the aspects of the distance part of the MHPE program that stimulate or enhance students' collaborative learning. Support from and collaboration with other students to better understand course materials, the presence of clear instructions on how and when to collaborate in some units, presence of real deadline, picking one's own group and trust in the group are the positive aspects of the distance MHPE program that stimulated students' towards collaboration. But, the students also mentioned some troubles, such as difficulty of accessing EleUM, lack or no facilitation by teachers, the difference in the pace of the students and lack of trust in some students or bad experiences in the beginning units (unit 1) as factors that hindered collaboration. Work overload and social commitments at home were also mentioned as factors that inhibited students' collaborative learning.

## CONCLUSIONS

Although this study has pointed towards strengths and weaknesses of the collaborative aspects of the MHPE distance courses, this study did not address factors such as the students' motivation to study and the time that is actually spent by students on this program. It is necessary to conduct further research to know if there are other factors like students' personal interest, motivation and background that may stimulate or inhibit collaborative learning in the distance part of the program. Furthermore, it would be worthwhile to investigate what the teachers' perceptions are about the collaborative aspects of the MHPE program.

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## **DEVELOPING AN E-CURRICULUM IN MICROBIOLOGY: USE OF DECISIONSIM™ SOFTWARE TO SIMULATE UNKNOWN CASES**

Kayleigh Jennings<sup>1</sup>, Carlos M. Isada<sup>2</sup>, Lulette Tricia Bravo<sup>2</sup>, Suzanne Schroeder<sup>2</sup>, Geraldine Hall<sup>2</sup>. <sup>1</sup>Ohio State University, Columbus OH, 43210 U.S.A., <sup>2</sup>Cleveland Clinic, Cleveland OH, 44195 U.S.A.

### **PURPOSE**

Delivering an effective curriculum in medical microbiology is becoming increasingly difficult, given the time constraints and economic pressures of teaching in a busy clinical laboratory. In the literature there has been a call for improved educational method in microbiology including the use of case-based learning and practical identification of unknown organisms. To address these challenges we developed a web-based microbiology curriculum using the open-source platform "Moodle."

### **METHOD**

The first section is a set of recorded lectures given by the laboratory faculty at the Cleveland Clinic covering fundamentals of clinical microbiology. The second section is a "boot camp" in basic microbiology techniques. Senior medical technologists were filmed performing key laboratory tests ranging from simple (such as the slide coagulase test) to more complex (such as identification of extended spectrum beta-lactamases). The third section involves case simulation using DecisionSim™ v 2.0. This software is designed for patient simulation using branch points for clinical decisions. We adapted the software to also simulate basic techniques in the laboratory. The student is presented with an unknown case, and asked to make management decisions including selection of diagnostic tests, antibiotics, and biopsies. After this, the student enters a laboratory simulation, and is asked to choose and interpret appropriate microbiologic procedures to identify organisms isolated from the simulated patient.

### **RESULTS**

Several platforms can be successfully integrated to create a Web-based curriculum for microbiology. DecisionSim™ v 2.0 software can be adapted to simulate both unknown patient cases and microbiology method, and is compatible with learning management systems such as Moodle.

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## **USING E-LEARNING IN SKILLS TRAINING FOR TECHNICAL MEDICINE**

Msc. Carla Steenbeeke E-learning specialist Technical Medicine University of Twente, The Netherlands

### **PURPOSE**

Recently technical medicine is using E-Learning in skills training. Students need to be prepared before they start practicing their skills. Knowledge and insight are both very important to perform a skill. E-Learning can help students to gain specific knowledge and insight. It creates a safe and rich learning environment in which students have the opportunity to prepare for a simulation training anytime, anywhere. E-Learning, as used in the technical medicine curriculum, goes beyond the standard E-Learning module in which students are guided through a protocol consisting of text and graphics, answer a question and receive feedback on their answer in terms of correct, incorrect. We think it is important that students have insight in their own capabilities and are able to create new protocols instead of performing the standard protocol over and over again. To achieve this goal, E-Learning in skills training in technical medicine for the course injections – punctures – catheterizations contains practical cases in which students need to design the most ideal protocol for the complex situation of a patient. After answering open questions and designing the most ideal protocol, students are watching a video with voice-over. The video explains how to administer the injection, puncture or catheterization. The video also discusses the answers to the open questions the students submitted.

### **METHOD**

The following principles are guiding the development of the E-Learning module: • Deliberate practice: Gaining insight in one's capabilities • Learner feedback: In style of video that explains the answers to the open questions and showing how to administer the injection, puncture or catheterization.

### **RESULTS**

Approximately 100 students are using the E-Learning modules. The modules have been evaluated by students. They indicated that the E-Learning modules help them to prepare for the practical.

### **CONCLUSION**

E-Learning in technical medicine is a powerful medium to help students to prepare a skills training. Due to E-Learning students gain the required knowledge and insight to perform a skill appropriately. To raise the E-Learning modules to the next level, specific feedback on the protocol given by the student can be provided. Also the use of simulations in the E-Learning module are preferable.

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### **VIRTUAL ANATOMY LABS FOR PRE-PROFESSIONAL HEALTH SCIENCES STUDENTS**

E.R.Walker, B.Kraspulska, J.Altemus, E.Allen, P. Klinkhachorn, H.Ressetar, W.Beresford Department of Neurobiology and Anatomy, WVU School of Medicine, Morgantown, WV 26506

#### **PURPOSE**

Our department turns away many students seeking an undergraduate human anatomy course as prerequisite for other programs. To address this problem, an online human anatomy course was designed. The course was successfully offered beginning in 2002.

#### **METHOD**

We are now addressing the question asked by students "Is there a lab with this course?" Virtual anatomy labs targeted for specific groups of students are now under development. The experience of working in the gross anatomy lab is often overwhelming for students, as there is little opportunity for preparation.

#### **RESULTS**

Our experience with nursing students indicates that online self-paced lab preparation is useful. Our first Virtual Anatomy Lab course is designed for pre- physical and occupational therapy, athletic trainers and pre-medical students. Emphasis of this course is limbs and back. The laboratory text Learning Human Anatomy with companion CDROM Anatomy Lab enables the student to work independently before coming to the gross anatomy lab. Virtual and real visits to the anatomy lab will be arranged in addition to the online assignments. The Virtual Anatomy Lab: Head and Neck will be the next course designed for dental hygiene and pre-dental students.

#### **CONCLUSIONS**

The combination of the general anatomy course and the Virtual Lab in an area of interest will provide sufficient information to fulfill prerequisite requirements and prepare for higher level anatomy courses.

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### **CREATION OF DIGITAL 3D SKELETON**

Jonathan J. Wisco, Sam Payne and M. Elena Stark, David Geffen School of Medicine at UCLA, Los Angeles, CA 90095, U.S.A.

### **PURPOSE**

Technological advancements in computer animation afford the possibility of creating and disseminating digital representations of anatomical structures. We created a digital skeleton model and presented it with interactive elements to provide students with an independent, didactic learning tool.

### **METHOD**

Anatomy faculty worked with a 3D animator to create a novel digital mesh of every bone using Autodesk Maya. Texture and color for each mesh were created in Adobe Photoshop and linked in Maya. Lighting was added to create shading and contrast effects. The digital bones were assembled into the full skeleton: spine and intervertebral disks were created first, followed by the skull, thoracic cage, pelvis, upper and lower limbs. Using Maya, digital cameras were added and then animated to create rotation videos and static images. Images were rendered from Maya in different layers and then composited in Adobe After Effects. Static images and videos were imported into Adobe Flash where interactive labels were added. The final product was published on our school's ANGEL website.

### **RESULTS**

The 3D skeleton is easily imported in any form or view into our instructional materials. Students have commented on the usefulness of the interactive skeleton for lab and independent study. Unlike 3D reconstructions of MRI or CT images, this artist and anatomists' rendition is built for animation purposes. However, creation of the 3D model using this methodology is much more difficult than image reconstruction.

### **CONCLUSIONS**

The 3D skeleton serves as a foundational animation for digital instruction of osteological structures and landmarks. This digital tool could be a viable substitute for osteological specimens where access to them is difficult.

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### **A VIRTUAL 3D MODEL OF EXTRAOCULAR MUSCLES AND EYEBALL MOVEMENTS**

Jonathan J. Wisco and Sam Payne, David Geffen School of Medicine at UCLA, Los Angeles, CA 90095, U.S.A.

#### **PURPOSE**

Testing movements of the eyeball is an important part of the clinical exam since three cranial nerves innervate the extraocular muscles. To help medical students understand the anatomical rationale behind the ocular tests, we created a 3D animated model of the eyeball and extraocular muscles and presented it with text and voice-over to describe the anatomy and physiology in detail.

#### **METHOD**

Anatomy faculty worked with a 3D animator to create a novel digital mesh of the eyeball and extraocular muscles using Autodesk Maya. Texture and color for each mesh were created in Adobe Photoshop and linked in Maya. Lighting was added to create shading and contrast effects. Using Maya, digital cameras were added and then animated to create videos of extraocular muscle actions on the eyeball. A detailed description in text and voice-over of the anatomy and physiology accompanied each video. Videos were rendered from Maya in different layers and then composited in Adobe After Effects. The final product was assembled into html format that could be viewed from any Internet browser.

#### **RESULTS**

The eyeball and extraocular muscles are easily imported in any form or view into our instructional materials. The videos depicting each muscle's movements on the eyeball and combined movements enhance the experience of learning and understanding the rationale for these important physical exam tests. We will disseminate this learning resource to the students prior to the upcoming neuroanatomy curriculum.

#### **CONCLUSIONS**

The 3D eyeball and extraocular muscles videos will provide a valuable resource to the students. Feedback will be solicited on how well instructional materials of this type enhance student learning.

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**UTILIZING SUPPLEMENTAL ONLINE PHARMACOLOGY MODULES LEADS TO INCREASED STUDENT SATISFACTION**

Peggy Y. Kim<sup>1</sup>, David W. Allbritton<sup>2</sup>, Ruth A. Keri<sup>3</sup>, John J. Mieyal<sup>3</sup> and Amy L. Wilson-Delfosse<sup>3</sup>

<sup>1</sup>Case Western Reserve University School of Medicine, Cleveland, OH <sup>2</sup>Department of Psychology, DePaul University, Chicago, IL <sup>3</sup>Department of Pharmacology, Case Western Reserve University School of Medicine, Cleveland, OH

**PURPOSE**

PBL curricula present unique challenges for pharmacology education. Learning opportunities may be overlooked by students, resulting in dissatisfaction.

**METHODS**

An online, supplementary pharmacology curriculum was developed for first-year medical students. Fourteen online, self-paced modules were written by faculty and students, and included a topic introduction, reading assignment and self-assessment quiz. Student satisfaction and utilization of the supplemental modules was measured using items from optional surveys and completion of module quizzes.

**RESULTS**

At the end of their first year, 137/163 students completed the voluntary survey; 73 completed at least half of the online module quizzes (high-use group) and 64 completed fewer than half (low-use group). The mean number of quizzes completed by the high-use group was 11.05 (SD=2.79) compared to 3.22 (SD=1.96) for the low-use group ( $t[29.0]=19.22$ ,  $p<0.001$ ). Students in the high-use group indicated greater satisfaction with their pharmacology learning and education ( $t[135]=2.15$ ,  $p=0.033$ ) and marginally greater satisfaction with their level of understanding about basic principles in pharmacology ( $t[123.9]=1.85$ ,  $p=0.066$ ). When asked to estimate what proportion of their pharmacology learning came from various sources, the high-use group indicated a higher proportion came from the online modules ( $t[135]=5.60$ ,  $p<0.001$ ) and from large/medium group interactive class sessions ( $t[121.3]=2.26$ ,  $p=0.026$ ) compared to the low-use group. The high-use group attributed a marginally higher proportion of learning to assigned readings than the low-use group ( $t[120.3]=1.86$ ,  $p=0.065$ ).

**CONCLUSIONS**

Students will utilize brief, supplementary, introductory, online modules in pharmacology; increased use is correlated with greater satisfaction.

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## **SELECTION OF A FACULTY PEER-REVIEW INSTRUMENT FOR THE ASSESSMENT OF MEDICAL SCIENCE LECTURING DURING THE PRE-CLERKSHIP MEDICAL CURRICULUM**

Charles Preuss, Craig Doupnik, Orhan Arslan, William Johnson, Yashwant Pathak, University of South Florida, Tampa FL 33543 U.S.A.

### **PURPOSE**

There is a growing recognition that student evaluations of faculty teaching might not capture enough data to improve faculty development in their teaching. Faculty peer-evaluations would provide additional feedback about the lecturer's teaching from peers who might be less biased as compared with students.

### **METHODS**

Three faculty peer-review instruments were used to evaluate a selected faculty member's lecture by five faculty peers. The three peer-review instruments were from the following: 1. University of Western Ontario (UWO), 2: Proceedings of the 2004 American Society for Engineering Annual Conference & Exposition (ASEE), and 3. Newman, L.R. et al. Academic Medicine 84(8), 2009 (NAM). Finally, the five peer-reviewers would provide frank feedback on the three instruments for assessing medical science lecturing during the pre-clerkship medical curriculum.

### **RESULTS**

Five faculty peer-reviewers assessed four different lecturers with the previously mentioned peer-review instruments: ASEE, NAM, UWO. The ASEE peer-review instrument received the following summarized comments: very simple, easy to use, user friendly, and a useful comment section. The NAM peer-review instrument received the following summarized comments: well designed assessment categories, font too small, too busy, and too wordy. The UWO peer-review instrument received the following summarized comments: too many categories, impractical format, and too many pages.

### **CONCLUSIONS**

The ASEE peer-review instrument was selected as the best of the three because it was on one page with ten assessment categories, it was easy to use and it had a useful comment section. This should facilitate the faculty peer-review process and faculty members who are assessed by it can easily translate their teaching evaluation into areas of strength and areas for improvement.

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**CASE BASED LEARNING: STUDENTS AS SELF-DIRECTED LEARNERS & FACULTY AS FACILITATORS, ARE WE THERE?**

Elkowitz,D.E., Fornari, A., Ginzburg,S. Hofstra North Shore-LIJ School of Medicine

**PURPOSE**

Hofstra North Shore-LIJ School of Medicine (SOM) established a faculty development(FD) program to train faculty on the why behind desired facilitator behavior in small group learning (SGL) sessions. This includes the do's and don'ts expected of facilitators in their SGL. The goal of the curriculum is to have the faculty understand the pedagogy of case based learning (CBL).

**METHODS**

A 3 step program: Journal Club: articles highlight different aspects of CBL are reviewed in a faculty-led session. The purpose of these articles is to underscore the CBL pedagogy & discuss controversial topics. Observation of small groups: Our faculty observed & interacted with CBL faculty at other schools & will utilize digitally recorded sessions as training tools. Observation & debriefing is crucial to assess their understanding of SGL. Group simulations: Over the course of 2 hours per week, the faculty will lead 8 cases. Debriefing will occur after each live SGL session.

**RESULTS**

The desired outcome is to assess faculty skills specific to facilitation of a CBL group. Measures of success will include peer to peer teaching, which must include higher order discussions & critical thinking. A total of 10 journal clubs, 4 tape reviews, and 16 1-hour group sessions will occur prior to the start of the academic year. Faculty & curricular evaluation data will be analyzed.

**CONCLUSION**

Faculty understanding of their role to create an atmosphere that promotes critical thinking requires a formal FD program. It is equally important to devise a program for the student. The success of the FD will be most evident in "real time" when skilled faculty observe faculty & students in SGL sessions & provide feedback. Formal & standardized FD is important in creating quality educational outcomes.

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**INSTILLING SCHOLARLY ACTIVITY: A FACULTY DEVELOPMENT INITIATIVE**

Lorraine Fugazzi, MBA, Staten Island University Hospital, Mary Salvatore, MD, Staten Island University Hospital

**PURPOSE**

Recent ACGME citations for lack of scholarly activity among faculty at Staten Island University Hospital (SIUH) facilitated an internal audit to highlight factors preventing research success. SIUH is a community based teaching hospital with 714 beds and approximately 240 residents and fellows.

**METHODS**

In January 2010, two key graduate medical education members were selected for the Harvard Macy Institute, Program for Educators in the Healthcare Professions, where they designed a pilot program to reduce these deficiencies. The educational theories provided during their intensive and transformative sessions in residence at Harvard Macy were utilized by the Director of Academic Affairs (DAA) and Radiology Program Director (RPD) to create the Faculty Research Pilot Program (FRPP). This program was designed to assess baseline competence, provide mentorship, promote research activity and improve patient care. The framework for the FRPP was developed by combining David Kolb's principles for learning and John Kotter's eight steps for leading change. The Department of Radiology was selected to test the FRPP model.

**RESULTS**

Research barriers were identified as the lack of: 1) an institutional research department, 2) awareness of processes, 3) administrative support, 4) protected time and 5) departmental interest. Using formal and informal presentations, 10 out of 26 faculty members agreed to participate. After the intervention, the results clearly demonstrated that scholarly activity increased with the efforts of the FRPP directly or indirectly.

**CONCLUSIONS/LESSONS LEARNED**

The FRPP model requires additional institutional support to a) focus research efforts and b) help the faculty design their research hypotheses with statistical validity.

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**WEBINAR AND DISCUSSION AS A USEFUL FACULTY DEVELOPMENT TOOL FOR MEDICAL SCHOOL AND HOSPITAL FACULTY**

Amal Khidir, MD, FAAP, Assistant Professor Pediatrics, Director of Pediatric clerkship Mary Anne Baker PhD, Director of Assessment and Academic Achievement Weill Cornell Medical College in Qatar, Doha, Qatar

**PURPOSE**

Weill Cornell Medical College in Qatar (WCMC-Q) a branch of Weill Cornell Medical College in New York began operation 2002. As a new campus using same curriculum presented challenges-distance from main campus, difference in time zone and weekends, and curricula differences. WCMC-Q has affiliation agreement with Hamad Medical Corporation as teaching hospital where Faculty have European and Middle Eastern training. Residency program is Arab Board based. This placed importance on starting faculty development program. Local resources were used, however, a US-based component was essential. IAMSE webinars have been effective tools in this setting.

**METHODS**

Faculty from both institutions were invited to webinars followed by local discussions. Each session lasted one hour for Webinar and one hour of discussion. Participants received two hours of CME for each session. A WCMC-Q faculty member moderated the sessions and evaluation form was used at each session.

**RESULTS**

Sessions were well received. Webcasts were effective modality 69%, presentations were good stimuli for on-site discussion 79%, onsite discussion enhanced understanding of topics 77%, and sessions were beneficial 80%. Moderator asked participants on how specific aspects of information might be applied to local clinical training. Over time discussions have increased faculty knowledge about new issues in medical education, and also improved collegial relations and networking between the institutions.

**CONCLUSIONS**

Webinars combined with local group discussion is a great opportunity for faculty development, especially in distant locations. It stimulates discussions and transforms medical education culture in both medical school and its affiliated hospital.

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## **VIDEO RECORDED ANATOMY LAB INSTRUCTION AS AN EFFECTIVE TEACHING TOOL**

Mary Bee, Robert McAuley, James Montante, Heather Haughey, Scott Burke, and George Preisinger,  
Oakland University William Beaumont School of Medicine, Rochester, MI, 48309

### **PURPOSE**

Human anatomy laboratory is one of the most challenging courses in medical school. Students are required to perform high quality dissections, even though most of them do not have previous experience and struggle with learning by merely reading a lab manual.

### **METHODS**

To make this task less daunting we produced a series of anatomy dissection videos to visually and audibly teach students the landmarks to focus on and how to dissect. Videos are approximately ten minutes in duration and illustrate dissection techniques and important anatomical relationships.

### **RESULTS**

Student feedback of the videos was overwhelmingly positive with 68% increased satisfaction from a group of students utilizing the dissection videos versus a control group. Student comments include "I have greater confidence and understanding of the dissections" and "I couldn't understand what they described in the book, but the video helped it all make sense." Furthermore, dissection quality of the students viewing the videos was significantly better than the control group ( $p < 0.01$ ).

### **CONCLUSIONS**

We discuss the process of producing the videos and advocate the use of dissection videos to help guide students in human anatomy dissection.

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**ENHANCING KNOWLEDGE RETENTION OF CARDIOVASCULAR PHYSIOLOGY USING SIMULATION**

Maureen Hall, Maria Sheakley, Meredith Sacks, Diana Callender, and David Pederson, Ross University School of Medicine, P. O. Box 266, Roseau, Commonwealth of Dominica, West Indies

**PURPOSE**

Basic Science Education (BSE) is essential for training competent physicians. Simulation allows students to learn the clinical relevance of BSE and helps to bridge knowledge gaps. The **PURPOSE** of this study is to show that by coupling simulation with BSE lectures, students better retain these concepts and clinical skills.

**METHODS**

A total of 1,632 first year medical students were given 4 hours of Cardiophysiology (CP) lectures. Furthermore, 1,108 students participated in a one hour simulation activity. To enhance the experience, 563 students were also given the option to take pre and post tests. Using "Harvey" Simulators, groups of 8 students were required to identify the proper anatomical land marks; auscultate heart sounds; and interpret the flow, pressure and volume changes. Subsequently, they were required to take a CP exam.

**RESULTS**

Students who had paired simulation and CP lectures scored higher on their CP exam compared to students without simulation. The mean score of the group without simulation was 64.6%, compared to a mean score of 70.5% for those with simulation. Students with both simulation and lectures, and who also took the pre and post tests, scored higher (75.1%) when compared with students who self-selected to take only the pre-test (73.6%) or the post test (71.2%). The groups that took neither the pre nor post test had a mean score of 66.5%.

**CONCLUSIONS**

The combination of simulation with the CP lectures for first year medical students has a significant impact on their CP exam scores in the short term. It also teaches them clinical skills and provides clinical context of BSE as early as first semester. A longitudinal study is needed to see if there is long term knowledge retention and improvement in their clinical skills.

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**A NEW TEACHING APPROACH IN BASIC SCIENCES: PEER ASSISTED LEARNING**

Mohammadreza Abedini<sup>1</sup>; Fathieh Mortazavi<sup>2</sup>; Seyed Alireza Javadinia<sup>1</sup>; Shahram Yazdani<sup>2</sup>; Davood Yadegari<sup>2</sup>; and Naser Valaei<sup>2</sup> <sup>1</sup>-Department of Pharmacology and Physiology, Educational Development Centre, Birjand University of Medical Sciences, Birjand, Iran <sup>2</sup>- Educational Development Centre, Shaheed Beheshti University of Medical Sciences, Tehran, Iran

**PURPOSE**

Studies on medical education suggest that Peer Assisted Learning (PAL) could be an acceptable and beneficial educational concept to organize the programs by which students can tutor or teach their peers. The present study was conducted in Birjand University of Medical Sciences (BUMS) to examine and compare the effects of two educational method Peer Assisted Learning and Teacher Based Learning (TBL, Lecture) on pharmacology learning and retention scores of medical students.

**METHOD AND MATERIALS**

This semi-experimental study was conducted on medical basic pharmacology for students divided in two groups PAL and TBL according to demographic features by block randomized sampling method. The data compiled using a questionnaire consisting of two parts including a) 15 demographic features questions and b) 30 multiple choice questions (15 questions on knowledge level, 11 questions on comprehension level and 4 questions on application level). The teaching were carried out in eight sessions (1.5 hours) for each groups who were attended the pre-test, immediate post-test and also three months post-test without any prior notice. Learning and retention were determined by subtracting of pre-test and immediate post-test scores, as well as immediate post-test and three months post-test scores after teaching, respectively. Paired t-test and t-test were used for assessing effectiveness of educational methods.

**RESULTS**

The study shows: a) both methods increase learning scores ( $p < 0.001$ ); b) PAL's learning score significantly higher than TBL in overall and knowledge level ( $p < 0.02$ ) as well as comprehension and application levels ( $p < 0.001$ ); c) PAL's retention marks are dramatically higher compared with TBL in overall ( $P < 0.001$ ), comprehension and application levels ( $P < 0.02$ ); d) there is no significant differences in PAL's and TBL's retention scores ( $P > 0.05$ ).

**CONCLUSION**

These findings support the notion that PAL is more effective than TBL (Lecture) on student's learning and retention, specifically in comprehension and application levels. PAL could be an effective mean to encourage students and improve their knowledge in basic sciences.

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**DETERMINATION OF LEARNING STYLE IN MEDICAL STUDENTS OF BIRJAND  
UNIVERSITY OF MEDICAL SCIENCES; BIRJAND, IRAN**

Seyed Alireza Javadinia, Gholamreza Sharifzade, Mohammadreza Abedini, Mehdi Khalesi, and Morteza Erfanian Educational Development Center, Birjand University of Medical Sciences; Birjand, Iran.

**PURPOSE**

Medical education is an essential mean for health promotion. Moreover, appropriate learning style(s) including VARK (visual, auditory, reading/writing performance/Kinesthetic) play an important role in medical student competency. In the present study, we determine the learning style of medical students in Birjand University of Medical Sciences (BUMS) to better understand the effective factors involved in medical student's knowledge and performance.

**METHODS**

This is a descriptive and analytical study which conducted in BUMS in the second semester of 2009-2010. The data was collected using the standard VARK self questioner by 148 medical students from different academic years which were randomly selected. SPSS software version16 was used to analysis the data.

**RESULTS**

Among 148 participants, 114 (77%) were female. Two-third of them (66.2%) were from pre-clinical stage. Auditory was the primary learning style counts for 48.6% of the total students attended in the study. While 16.2 % of the students chose reading/writing style, kinesthetic/performance and visual styles were selected equally by 12.8% of them. Interestingly, 9.6% of the participants took two or more learning styles. Although variables such as sex and student academic year had no significant effects on student's performance, the study demonstrated that there was a significant correlation between used learning style and student's average scores ( $P= 0.025$ ). This means, the average marks of clinical students who used kinesthetic style dramatically was higher than the other student's scores.

**CONCLUSIONS**

These results support our hypothesis that kinesthetic learning style is more effective mean for medical education, specifically in clinical teaching. Application of different learning styles including kinesthetic instead of auditory alone could be more beneficial for student's learning and competency.

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**REGION VS. SYSTEM BASED ANATOMY: IMPLEMENTATION AND EFFICACY**

Orhan E. Arslan and Stanley J. Nazian, University of South Florida, Tampa, FL 33612 U.S.A.

**PURPOSE**

Traditionally, gross anatomy has been presented in a regional format, starting with the back and progressing through the extremities, head, thorax, abdomen and pelvis. Such a teaching model can be difficult to implement within an integrated, organ based curriculum. Here we evaluate a system-based model.

**METHODS**

Our gross anatomy is taught within an integrated curriculum. Lectures, reinforced by clinical presentations and active learning sessions, are videoarchived and posted. The laboratory component includes dissection, computer, procedure and ultrasound based activities. The musculoskeletal system is taught first due to its accessibility, then the nervous, respiratory, circulatory, digestive, reproductive, endocrine and urinary systems. Structures not easily accessible are shown on prosected cadavers. Half of the body is used for nerves, the other for arteries and veins. Thus, structures are revisited and dissected bilaterally. Students master structures relative to one system as a foundation for subsequent systems, providing uninterrupted knowledge.

**RESULTS**

During the past 4 years, the curriculum evolved from individual discipline based courses taught sequentially, to its present configuration of multi-disciplinary, system-based courses. The incorporation of anatomy into the curriculum as a whole was enhanced by this system based approach. Student numerical performance in anatomy was not significantly affected by this transition or the changes in curriculum. Student ratings of this model were favorable.

**CONCLUSION**

Gross Anatomy can be successfully presented using a system based approach. Such a teaching model incorporates more readily into a modern integrated curriculum without demonstrable impact on student proficiency in anatomy.

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## **TEACHING LEARNING METHODS THE TEACHER'S MENU AND THE LEARNER'S CHOICE**

Gita Ashok Raj, MBBS, MD (Pathology), MNAMS (Morbid Anatomy) Provost and Professor and Head of the Department of Pathology at the Gulf Medical University in Ajman, United Arab Emirates

### **PURPOSE**

In keeping with the design of the new integrated organ system based MBBS curriculum that is more learner centered than the traditional curriculum, teaching learning strategies that keep the students in an active learning mode were introduced. As part of the audit process the data available from course evaluations of the first 13 modules was reviewed to investigate which of the many teaching methods is preferred by the majority of the students

### **METHODS**

7 modules in Phase I (Introduction to Medical Sciences); 6 modules in the first year and 2 of the 4 modules in the second year of Phase II (Organ Systems) have been taught and evaluated so far during period Sept 2008 to January 2011 by the Institutional Research Unit at GMU. 11 teaching methods and strategies have been used so far, in different combinations as appropriate to the learning outcomes, including, Clinical skills sessions; Problem Based Learning; Case Based Learning; Lectures; Laboratory sessions; Small Group Learning; Self-Directed Learning; Role play; Course work; Reflective diary writing; Tutorial; Videos; Computer assisted learning; Seminars; Reading assignments; Visits to Old Age Home, Hospital Lab, a fertility centre, ICU and a workplace, the ultrasound clinic in the antenatal clinic. A total of 59 students in Phase I; 47 students in Phase I Year 1 and 46 students in Phase II Year 2 of the 2008 Batch of the MBBS program were administered a questionnaire and asked to indicate the teaching learning method(s) that contributed maximally to their overall learning in the Module using numbers to indicate a descending order of effectiveness in the appropriate labeled text boxes indicating the teaching method.

### **RESULTS**

The responses were compiled and percent distribution for each teaching method was tabulated for each unit of instruction. The data for each module was matched and sorted to highlight the teaching method that had higher frequency. It was observed that majority of the students had greatly benefited in their learning from the following teaching methods and learning strategies in descending order of their contribution to the student's learning: Clinical skills sessions; Problem Based Learning; Case Based Learning; Lectures; Visit to the ultrasound clinic; Laboratory sessions; Small Group Learning; Self-Directed Learning; Role play; Visit to workplace; video demonstrations; Visit to Old Age Home; Visit to the Hospital Lab; Computer assisted learning; Seminars; Reading assignments; Visit to fertility center; Visit to ICU; course work; Reflective diary writing; and Tutorials.

### **CONCLUSIONS**

Majority of the students at Gulf Medical University comes from schools where pedagogy keeps the learner in passive mode. The transition of student from pedagogy to adult learning is challenging for the learners where they are expected to adopt more active learning methods. It is reassuring to see that they have greatly benefited from the current trends in teaching and learning that promote active learning.

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**DEVELOPMENT OF STUDENT-LED TEAM BASED ACTIVE LEARNING WITHIN A BASIC SCIENCE YEAR 1 MEDICAL COURSE**

Craig A. Doupnik, Ph.D., University of South Florida College of Medicine, Tampa FL 33612 U.S.A.

**PURPOSE**

The Learning Pyramid, widely adopted by a variety of training programs, identifies 'Teaching Others' as having the greatest impact on student learning when compared to other instructional

**METHODS**

(passive or active). To begin to assess the effectiveness of student teaching in the 1st year medical curriculum, Student-led Team-Based Active Learning (TBAL) sessions were developed for a 9-week basic science course on cardiopulmonary systems. **METHODS.** Six Student-led TBAL sessions, each 1 hr in length, were scheduled in pairs and coordinated with related content area. First year Medical Students (120), Doctor of Physical Therapy students (32), and Masters students (11) were randomly organized into 20 small groups. For each session, 3-4 small groups were assigned a clinical case two weeks in advance and instructed to collaborate, research, and then present 9 different Topic Areas (i.e. physiological features) addressing the case. Audience response 'clicker' questions for class active learning were also required. Each session was then assessed by a peer evaluation survey.

**RESULTS**

Peer evaluation results demonstrated both favorable and constructive feedback to the student teaching groups. Comparisons of the paired sessions indicated one of the sessions was often rated higher than the other, indicating peer discrimination of student performance. Student concerns expressed about the sessions included anxiety from presenting in front of their peers and a large group.

**CONCLUSIONS**

Student-led TBAL sessions can be successfully incorporated into the Year 1 basic science curriculum. The effectiveness of the sessions on reinforcing student understanding of basic science material remains to be assessed, as well as their potential benefit on professional development.

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**TEACHING MEDICAL GENETICS IN NEPAL: CULTURAL IMPLICATIONS AND TEACHING STRATEGIES**

Jane Gair. Island Medical Program, Division of Medical Sciences, University of Victoria and Department of Medical Genetics, Faculty of Medicine, University of British Columbia, BC, Canada

**PURPOSE**

I teach medical genetics to medical students in Canada. Although there are topics and terms that are very "charged" with meaning in genetics, such as abortion, prenatal diagnosis, genetically modified organisms (GMOs), evolution and eugenics, I have been teaching these topics in the culture in which I was raised. Teaching these same topics in Kathmandu, Nepal will require a totally different approach. As I prepare to leave for Nepal to teach medical genetics in the Patan Academy of Health Sciences (PAHS), I wonder how different it will be. I want to explore the cultural complications that might arise for me, for the students and for the faculty involved in teaching medical genetics in Nepal - from an anthropological point of view. How will my teaching strategies be affected?

**METHODS**

My main method will be to document my thoughts, work process and experiences as I prepare my materials for Nepal and as I teach in Nepal and I will compare this to the same things in Canada by taking field notes, blogging and consulting with other professionals. My Nepalese colleagues will follow my blog so I can get their comments and opinions. I will conduct interviews with students and faculty in Nepal to ask general questions about their experience with genetics and how they understand its relationship to medicine before I start teaching. I will then do interviews with the same people to see if they feel that what I presented was what was expected and if I missed anything they felt would be important. I will create a culturally informed manual of terms, concepts and images for Western faculty teaching in Nepal.

**RESULTS**

This is a work in progress as the trip. At this point, the blog is set up and I am exploring some of my main concerns prior to heading to Nepal.

**CONCLUSIONS**

Pending

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**HOW MUCH IS TOO MUCH READING?**

Edward C. Klatt and Carolyn A. Klatt, Mercer University School of Medicine, Savannah, GA, 31404 USA

**PURPOSE**

The amount of reading assigned to health science students in their curriculum can be substantial. This study asks: how does the reading rate impact the time required to complete assigned reading?

**METHODS**

The potential reading rates for health science students were taken from published studies of reading in relation to the size of standard science textbooks. The time required for students to complete projected reading assignments at their likely reading rate in words per minute (WPM) was estimated from this data.

**RESULTS**

There are five standard reading levels, depending upon the goal for reading. At the fastest scanning level, students can read up to 600 WPM to recognize just a few target words. Students can shift their reading rate to 450 WPM with skimming to get an overview of the text with some connected words, but not whole sentences. For most reading to comprehend whole sentences in context, as one would read a novel for pleasure, the reading rate is 300 WPM. If students are given no objectives, but are memorizing text for recall and recitation, they read at 150 WPM. Students given specific objectives and who must pass a high stakes examination with difficult questions may not exceed a reading rate 100 WPM. The average science textbook has 267,000 words printed in 500 pages at 534 words per page. At 100 WPM, a student takes at least 5 minutes to read just words on one page of text, not counting additional figures, graphs, or charts, and processes no more than 12 pages per hour.

**CONCLUSIONS**

For each 100 pages of textbook reading assigned, students will require 8 hours and 20 minutes to read at 100 WPM to pass difficult examinations. Faculty should consider the amount of assigned reading that could reasonably be accomplished by their students.

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## **SKILLS AND SCIENCE: AN INTEGRATED FEMALE GENDER-SPECIFIC LEARNING EXPERIENCE**

Michele A. Manting, M.D., M.Ed. Associate Professor and Director of Obstetrics and Gynecology Education Florida State University College of Medicine Tallahassee, FL

### **PURPOSE**

To prepare second year medical students in the basic science grounded clinical skills necessary for completing a Well Woman Encounter simulated with Standardized Patients

### **METHODS**

A 2 hour session was divided into 40 minute segments where basic science rationale for clinical practice was emphasized. Stations provided hands-on experience in 1) Standard Clinical Breast Examination; 2) Pelvic Examination and genital specimen collection; and 3) vaginitis work-up that included live organisms and microscopy. Clinical and basic science faculty conducted the sessions. 30 students were assigned to each 2 hour session where 10 students rotated together through each of the three stations. Sufficient faculty was present to reinforce content and facilitate deliberative practice. Students were asked to complete evaluations for both the Skills Session and Well Woman Encounter. Clinical faculty and SP's also evaluated students in the Well Woman Encounter.

### **RESULTS**

There was a 92% response rate to the session evaluation. 98% of students agreed or strongly agreed that the session: 1) provided a clear connection between basic and clinical sciences; 2) improved understanding of the procedures involved in the care of women; and 3) was a meaningful educational experience that will be of value to future medical students. After completing the Well Woman Encounter, 90% of students agreed they felt adequately prepared. Only 2% of students disagreed. Faculty and SP evaluations confirmed student self-assessment.

### **CONCLUSIONS**

The Skills session met all goals. This is quite remarkable since the faculty staff is not comprised of seasoned OBGYN specialists. Instead, Family medicine, Geriatrics, General Surgery, Internal Medicine and Pediatric sub-specialists staffed the sessions.

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**MIND MAPS: USEFUL SCHEMATIC TOOL FOR ORGANIZING AND INTEGRATING CONCEPTS OF COMPLEX PATIENT CARE IN THE CLINIC AND CLASSROOM: PERSPECTIVE FROM THE STUDENTS AND FACULTY**

G. Pinto Zipp, Department of Graduate Programs in Health Sciences, Seton Hall University, South Orange, NJ; C. Maher, Department of Physical Therapy, Seton Hall university, South Orange, NJ; A.

**INTRODUCTION**

As faculty we are faced with the responsibility of developing a student's knowledge base and critical thinking skills using diverse teaching and learning strategies. To date, medical science educational programs have utilized numerous learning strategies including journals, practice patterns, problem-based learning (PBL), case-studies, and hypothesis-oriented algorithm for clinicians (HOAC) (Shepard et al., 2002) in order to help students to critically organize, prioritize and plan systematic strategies to promote client management. Recently mind mapping has been reported as a teaching and learning strategy in health care programs including physical therapy, osteopath and chiropractic. Mind Mapping is a learning technique which uses a non-linear approach to learning that forces the learner to think curvilinear using visuospatial relationships flowing from a central theme to peripheral branches. Assisting health care professional students to critically analysis and think about client management using a non-linear approach to learning such as mind mapping maybe effective in promoting critical thinking. The purpose of this study was to explore the mind mapping learning technique from two perspectives. First to determine the knowledge and prevalence of mind mapping usage by faculty in physical therapy education, and second to determine students' perceptions of the usefulness of the mind map learning technique in promoting course material organization, prioritizing and integration in PT education.

**METHODS**

To protect the voluntary participation of the subjects' in the study, two web based surveys were administered using the university ASSET survey tool. A link to the surveys were provided via an email request from the investigators. The faculty survey was electronically sent to all accredited physical therapy programs chairs to access their knowledge of and utilization of the mind mapping technique within their curriculum. The student survey was administered to Doctor of Physical Therapy (DPT) students enrolled in a neurorehabilitation course who were required to create mind maps based upon assigned readings for six diagnoses. The students were asked to complete a post-course survey to assess their perceptions of the usefulness of the mind map learning technique in improving organization, prioritizing and integration of course material. All survey data was anonymous and analyzed using aggregate data.

**RESULTS**

The 55 departmental chair respondents indicated that only 10% of their faculty currently used mind maps, however 56% believe that program faculty would be interested in using mind mapping in teaching. Of the 21 DPT students who responded to the survey 38% perceived that mind map learning technique enabled them to better organize, 10 % to prioritize and 33 % to integrate material presented in the course. In areas of knowledge 28% positively responded that mind mapping improved their understanding and retention of material covered. The poster presentation specifically will review the data obtained from both surveys and offer insight into the utility of the technique.

## CONCLUSION

While the data obtained from these two surveys do not offer support for the use of mind mapping techniques in DPT education the findings do not negate the usefulness of mind mapping as a learning tool from both faculty and student perceptions. Thus, further work is needed to explore mind mapping usefulness in developing critical thinking skills in health professional students.

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**ENHANCING MEDICAL EDUCATION WITH LONGITUDINAL CASES: BRIDGING BASIC SCIENCE AND CLINICAL KNOWLEDGE**

Mark Sandefur, Sara Aberle, Elizabeth Angstman, Jodi Blustin, Paul Warner. Mayo Clinic, Rochester, MN, USA.

**PURPOSE**

The purpose of this project was to determine if the addition of longitudinal patient cases during Anatomy and Pathology would increase first year medical students' integration of didactic medical knowledge with their clinical critical thinking skills.

**METHODS**

Educational modules containing longitudinal patient scenarios were assigned weekly. Cases reflected material covered in didactics; the assignments focused on clinical aspects of disease, including patient presentation, assessment, diagnosis, treatment, and social issues. Surveys were completed by 33 students before and after the study to assess the following areas on a 1-100 scale: translation of knowledge from class to clinic, confidence in using medical resources, and confidence in approaching patient care situations.

**RESULTS**

Survey results indicate significant increases in both experience ( $p=0.0001$ ; paired t-test) and confidence ( $p=0.0003$ ; paired t-test) of utilizing clinical information to work toward a differential diagnosis and treatment plan; preliminary assessment results support this. Results indicate a trend toward increased ability to gather clinical information; this trend was not significant ( $p=0.09$ ; paired t-test). Responses also indicate increased frequency of consideration of how basic science facts pertained to patient care ( $p=0.008$ ; Wilcoxon signed-rank test). There was a marked gain in comfort of navigating online medical resources.

**CONCLUSIONS**

The use of longitudinal cases provides a tool to integrate basic science knowledge into clinical critical thinking skills. Students became more confident and showed evidence of improvement in developing differential diagnoses and treatment plans; they also demonstrated evidence of increased competence when utilizing online medical resources.

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**HOW YEAR I MEDICAL STUDENTS PERCEIVE YEAR IV MEDICAL STUDENTS AS TEACHING PRECEPTORS IN THE DOCTORING I PHYSICAL DIAGNOSIS COURSE: RESULTS OF A SURVEY.**

Richard J. Schrot, M.D. Associate Professor, Department of Family Medicine University of South Florida College of Medicine, Tampa, Florida 33612 Stephanie Peters, M.A. Associate in Education, Department of Family Medicine University of South Florida College of Medicine, Tampa, Florida 33612 Fred Slone, M.D. Medical Director, Center for Advanced Clinical Learning University of South Florida College of Medicine, Tampa, Florida 33612

**PURPOSE**

For the entire Physical Diagnosis course, the hands-on sessions are taught by a faculty preceptor and a year IV medical student preceptor to the same group of 8 students. The purpose of this poster is to present survey results of year I medical students' perceptions of their experience with the year IV medical student teachers.

**METHODS**

After 6 months with the same small group, all year I medical students were electronically sent the following survey questions relating to: (1) Level of learning enhancement (2) Communicating with faculty vs. year IV student preceptors (3) Teaching skills of faculty vs. year IV students.

**RESULTS**

78% of year I students completed a survey. Question results (1) 1% felt year IV students did not enhance learning, 14% felt learning was somewhat enhanced and 85% said learning was definitely enhanced (2) 1% were not at all comfortable communicating with year IV students, 71% said communication was the same with faculty and student preceptor and 28% said communication was definitely better with MS IV. (3) 14% said faculty had better teaching skills, 69% said teaching skills were the same and 17% said MS IV students had better teaching skills.

**CONCLUSION**

The survey shows that year IV medical student preceptors definitely enhanced learning of Physical Diagnosis skills, provided more comfortable communication than their faculty counterparts, and have similar or slightly better teaching skills.

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**REAL-TIME INTEGRATION OF PHYSIOLOGICAL CONCEPTS IN A SIMULATED CLINICAL ENVIRONMENT**

Cynthia Standley and Paul Standley, University of Arizona College of Medicine-Phoenix, Phoenix, AZ, 85022 U.S.A.

**PURPOSE**

Students learn best when small group instructional methods are used; when they are engaged in the observation of others; when students can serve as their own "subject" in dynamic experiments; and when they participate in active learning environments. The objective of this teaching modality was to provide opportunities for students to apply basic science concepts in a simulated clinical-type environment.

**METHODS**

Six BioPac™ Student Lab Systems composed of integrated hardware, software and lab manuals were adapted to provide real-time demonstrations of physiological principles to first year medical students in the Cardiovascular/Pulmonary/Renal Block and the Musculoskeletal Block. The program began in academic year 2008 and has been expanded each year since. Sessions are held in the Objective Structured Clinical Exam rooms. Students work in groups of 4, and rotate between the role of clinician, patient, data recorder and observer. Laboratory sessions included ECG, heart sounds, blood pressure, pulmonary function, and EMG. All laboratory sessions were comprised of a lesson plan with objectives, thought questions, recommended reading and a data report. Students completed their laboratory reports within one week of the lab using their own data.

**RESULTS**

To date, 168 students have participated in the sessions. Almost 90% of the students agreed that these laboratory sessions reinforced basic science concepts and provided the opportunity to apply basic science concepts in a clinical scenario. Approximately 70% agreed that the laboratory sessions were a useful modality to gain new information. Most of the sessions provided a way to reinforce material, however many sessions did require the students to learn new concepts on their own. Students would like to have more class time devoted to discussion and interpretation of the data.

**CONCLUSIONS**

The BioPacs allowed students to engage in real-time demonstrations of physiological concepts in a simulated clinical environment during their undergraduate medical education. Students enjoyed applying knowledge learned in class to obtaining live-time data. This modality of learning produces positive educational outcomes and provides for collaborative and cooperative learning activities.

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**IMPORTANCE OF ATTENDANCE AND STUDY MATERIALS/METHODS DURING A MEDICAL SCHOOL NEUROSCIENCE COURSE: ARE TIME-RELATED CHANGES AND CORRELATIONS WITH ACHIEVEMENT PRESENT?**

Laura C. Stanley and Judith E. Garrett, University of Arkansas for Medical Sciences, Little Rock, Arkansas 72205 U.S.A.

**PURPOSE**

Changes in attendance and in use of study materials/ methods during a course (time-related changes) are not well studied. In addition to study materials/ methods available for the last five years, a new lecture-recording system (Wimba) provided recordings of both sound and what was seen on screens in the lecture hall. This study asks: are there time-related changes in the value students give to class attendance and specific study materials/methods, and is there a correlation with course achievement? Secondarily it asks: is there a correlation between participation in the study and achievement?

**METHODS**

A class of 174 freshmen medical students was invited to participate in two surveys: the first given at the beginning of and the second given at the end of their neuroscience course. Surveys administered via Blackboard 8 measured student-ranked importance on a scale of 1 - 5 for each of the following items: 'attending class,' 'board prep books,' 'canned notes,' 'recorded lectures,' 'old tests,' 'textbooks,' 'power point slides,' and 'web sites.'

**RESULTS**

Importance of 'attending class,' 'textbook use,' and 'use of web sites' did not significantly change from the beginning to the end of the course. However, there was a significant decrease at the end of the course in student-ranked importance of 'board prep books,' 'canned notes,' 'recorded lectures,' 'old tests,' and 'power point slides.' This change in importance was not significantly related to achievement. The greatest decrease in importance from the beginning to the end of the course was seen in 'old tests.' 'Power point slides' were ranked higher in importance than all other items even after the decrease in 'power point slides' importance at the end of the course. After 'power point slides,' the students ranked 'attending class' as second most important at both the beginning and end of the course. 'Board prep books' followed 'attending class' at the beginning but was superseded by 'textbooks' and then 'websites' at the end of the course. The ranking of 'recorded lectures' was similar to that of 'textbooks' at the beginning of the course but was lower at the end. Lowest overall importance was given to 'canned notes.' Students who participated in the surveys were significantly higher achievers than those who did not.

**CONCLUSION**

The greater importance students placed on power point presentations and attending class could indicate students find direct means of communication of information, i.e., written and spoken by their professors, most useful. The lack of a time-related change in importance of traditional means of learning, i.e., 'attending class' and 'textbooks,' together with that of the more recent 'websites' supports the concept of the Internet as a new standard in medical school education. Time-related changes in other categories together with the lack of a correlation of achievement could mean students were successful at finding the best means for themselves to maintain their grades. These conclusions apply to higher achieving students, as they were more willing to participate in the study than were other students.

**TAKING A NUTRITION HISTORY: USING A STANDARDIZED PATIENT INTERVIEW AS A CLINICAL APPLICATION IN A BASIC SCIENCE NUTRITION COURSE**

Patricia Ruth Atchinson, Jaclyn Barcikowski, Daniel Pievsky and Kathryn H. Thompson, University of New England College of Osteopathic Medicine, Biddeford, ME 04005 U.S.A.

**PURPOSE**

Nearly 2/3 of the U. S. population are overweight or obese and are at risk for chronic diseases. Despite evidence that physicians can positively affect patients' nutrition practices, graduating medical students feel underprepared to counsel patients about nutrition. To address this problem, first-year medical students in a nutrition basic science course were asked to interview standardized patients in order to apply nutrition concepts and practice taking a nutrition history.

**METHODS**

Students were introduced to content regarding the nutrition history through reading assignments and lectures. They were divided into teams of 6-8 and each team was assigned 3-4 patients to interview. Students developed a plan for the interview. Two students worked together to interview each patient and the remaining team members watched the interview by remote video. Subsequently, the team wrote a focused SOAP note including the nutrition history, assessment and plan.

**RESULTS**

In 2009, 71% of the students completing the course survey agreed or strongly agreed that the patient interview was a useful learning experience. In 2010, 53% of the class who completed the course survey ranked the patient interview as the most important learning experience in the course with another 31% ranking it as important.

**CONCLUSIONS**

We have established that students report the patient interview portion of the course is a good learning experience. In order to assess whether the interview experience increases student confidence in nutrition counseling, we will develop a survey to be given before and after the interview experience and again to the same students while on clinical rotations. The survey will assess the effectiveness of the patient interview exercise on student confidence.

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**PROSECTION VERSUS DISSECTION ANATOMY PEDAGOGIES: WHICH ONE PREPARES STUDENTS BETTER FOR GAINING CLINICAL SKILLS CONFIDENCE?**

Seth D. Lerner<sup>1</sup>, Paul Rabedeaux<sup>1</sup>, Paul Wimmers<sup>1</sup>, Craig Byus<sup>2</sup> and Jonathan J. Wisco<sup>1</sup>, <sup>1</sup>David Geffen School of Medicine at UCLA, Los Angeles, CA 90095, U.S.A., <sup>2</sup>UCR Thomas Haider Program in Biomedical Sciences, Riverside, CA, 92521, U.S.A.

**PURPOSE**

Studies have demonstrated that prosection and dissection anatomy pedagogies yield statistically equivalent mastery of knowledge, but it is not known which one students perceive as preparing them better for learning clinical skills.

**METHODS**

As part of a longitudinal study, we conducted the first of seven annual surveys, with Likert-style questions and free responses, of 1st-4th year medical students at the David Geffen School of Medicine at UCLA/Charles R. Drew University (CDU) of Medicine and Science and the UCR Thomas Haider Program in Biomedical Sciences. Other than anatomy pedagogies, the curriculum between schools is identical. We compared Likert responses between UCLA/CDU prosection only, UCLA/CDU prosection and dissection, and UCR dissection only students. We also analyzed performance on shelf exam scores and on a standardized 8-station OSCE between prosection only and dissection only students.

**RESULTS**

Out of 450 surveys distributed, we received responses from 90 UCLA/CDU and 17 UCR students. MANOVA analysis for survey themes of skill training [ $F(2,103)=2.38$ ,  $P=0.0182$ ], learning methodologies [ $F(2,96)=3.05$ ,  $P=0.0072$ ] and curriculum recommendations [ $F(2,96)=9.73$ ,  $P<0.001$ ] were significantly different between the three cohorts. ANCOVA analysis for combined shelf exam performance revealed that, with total MCAT score as a covariate, dissectors performed significantly better [ $F(2,23)=7.58$ ,  $P=0.0030$ ] than prosection only students. Other objective assessments were not significantly different.

**CONCLUSIONS**

The dissection experience appears to prepare students better for knowledge-based assessments and help students feel (but not objectively justified) more confident with their anatomy foundation for clinical skills. This study was approved with an IRB Exempt Protocol.

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**SCAFFOLDING STUDENT DEVELOPMENT AS THEY BREAK THROUGH THE ADVANCED KNOWLEDGE BARRIER**

Joanne Buckland and Courisse Knight, St. George's University, True Blue, St. George's, Grenada, West Indies.

**PURPOSE**

Medical schools aim to recruit students matched in ability and aptitude. These learners often enter medical school without the requisite skills for lifelong learning. Research has suggested that stand alone learning strategies courses are ineffective as students are unable to transfer their knowledge about learning to detailed science courses. We have implemented a learning strategies course in a preprofessional program that directly links the learning strategies content with the complex and ill-structured nature of the advanced, detailed science courses. This abstract describes the project and its proposed outcomes.

**METHODS**

A team of faculty responsible for providing academic advising and support for students in the professional programs and learning strategists identified learning challenges students face in the upper level sciences. Human and Biomedical Anatomy were chosen as science courses where students experienced disillusionment about their learning. An evidence based intervention was designed to help students discover how and when to use their knowledge of self to move toward cultivating advanced knowledge skills. Weekly assignments provided feedback to adjust the learning strategies course content to student needs. This process was scaffolded by contact with advising and course faculty and other education specialists.

**RESULTS**

Final results will be available in May. The greatest benefit is that the learning strategies are relevant and timely. The challenges include the quick turn around time and the amount of organization needed to produce a quality class.

**CONCLUSIONS**

With a willingness to be flexible and adaptable the learning strategies course can be intimately connected to the detailed science courses and have a greater transfer of knowledge and skill.

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## **INTERACTIVE TOOLS TO TEACH PHARMACOLOGY IN SYSTEMS-BASED MODULES TO 2ND YEAR MEDICAL STUDENTS**

A. Laurel Gorman, Department of Medical Education, UCF College of Medicine, Orlando, FL.

### **PURPOSE**

The purpose of this presentation is to characterize interactive tools used to teach pharmacology in an innovative and engaging manner to 2nd year medical students taking clinically integrated systems modules.

### **METHODS**

Interactive techniques employed included clicker audience-response systems within lectures as well interactive automated slides that were completed with audience participation. Online review games and case-based self-study exercises were distributed to students as well. Preliminary assessment of student perception of usefulness was made through a survey as well as questions in the faculty evaluation. Initial observations of student participation were made comparing traditional didactic sessions with more interactive sessions presented by that faculty member.

### **RESULTS**

Preliminary results suggest that students had positive perceptions of the more interactive exercises as responses to surveys and evaluations were highly positive, with average scores greater than 4 on a 5 point scale for various questions assessing the usefulness of the techniques in promoting different components of learning. Observations included an increase in questions asked by students and wider distribution of students actively participating in the interactive sessions versus traditional didactic sessions. Several students asked for more of such exercises in future sessions.

### **CONCLUSIONS**

Preliminary data and observations suggest that incorporation of interactive exercises into pharmacology sessions appears to be an effective learning tool that reinforces critical concepts, increases classroom engagement and interest, and helps students to prepare for module exams as well as step 1 boards.

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**A NEW TEACHING APPROACH IN BASIC SCIENCES: PEER ASSISTED LEARNING**

Mohammadreza Abedini<sup>1</sup>; Fathieh Mortazavi<sup>2</sup>; Seyed Alireza Javadinia<sup>1</sup>; Majid Zare Bidaki<sup>1</sup>, Shahram Yazdani<sup>2</sup>; Davood Yadegari<sup>2</sup>; and Naser Valaei<sup>2</sup> <sup>1</sup>-Department of Pharmacology and Physiology, Educational Development Centre, Birjand University of Medical Sciences, Birjand, Iran <sup>2</sup>- Educational Development Centre, Shaheed Beheshti University of Medical Sciences, Tehran, Iran

**PURPOSE**

Studies on medical education suggest that Peer Assisted Learning (PAL) could be an acceptable and beneficial educational strategy to organize the programs by which students can tutor or teach their peers. The present study conducted in Birjand University of Medical Sciences to examine and compare the effects of two educational methods Peer Assisted Learning and lecture on medical students learning and retention scores.

**METHODS**

This semi-experimental study was conducted on medical basic pharmacology teaching for students who divided in two groups PAL and lecture based on demographic features through a block randomized sampling method. Data compiled using a questionnaire consisting of: a) 15 demographic features questions and b) 30 multiple choice questions [knowledge level (15 questions), comprehension level (11 questions) and application level (4 questions)]. The teaching were carried out in eight sessions (1.5 hours each) for both groups who were attended the pre-test, immediate and also three months post-test without any prior notice. The student's learning and retention determined by subtracting of pre-test and immediate post-test scores, as well as immediate post-test and three months post-test scores after teaching, respectively. Paired t-test and t-test were used for assessing effectiveness of educational methods.

**RESULTS**

The study demonstrates: a) both methods increase learning scores ( $p < 0.001$ ); b) PAL's learning score significantly higher than lecture in overall and knowledge level ( $p < 0.02$ ) as well as comprehension and application levels ( $p < 0.001$ ); c) PAL's retention marks are dramatically higher compared with lecture in overall ( $P < 0.001$ ), comprehension and application levels ( $P < 0.02$ ); but not in knowledge level ( $P > 0.05$ ).

**CONCLUSIONS**

These findings support the notion that PAL is more effective than lecture on student's learning and retention, specifically in comprehension and application levels. PAL could be an effective mean to encourage students and improve their knowledge and performance in basic sciences.

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## **INTERPROFESSIONAL COMPONENTS OF A NEW MEDICAL STUDENT TRANSLATIONAL RESEARCH TRACK**

Judith F. Aronson <sup>1</sup>, Gustavo Valbuena <sup>1</sup>, Mark R. Hellmich <sup>2</sup>, Ann Frye <sup>3</sup>, Gregory K. Asimakis<sup>3</sup>  
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### **PURPOSE**

Translational research applies scientific discoveries to the prevention, diagnosis, or treatment of disease, and uses observations made in patients to inform scientific studies. Inter-disciplinary teams will drive effective translational research of the future. We are developing a translational research track (TRT) that aims to prepare medical students to function in collaborative translational research teams with Ph.D scientists. The TRT features interprofessional education with graduate students from the parallel Human Pathophysiology and Translational Medicine graduate program (HPTM).

### **METHODS**

The TRT embeds 6 months of track activities within the standard integrated medical curriculum. For the first three medical courses, TRT students will work in a problem based learning (PBL) group with HPTM graduate students. During the summer after year 1, TRT students will participate in a research design course with the same group of graduate students. TRT students will also participate in longitudinal interprofessional enrichment activities, translational research seminars, and 3 months of translational research electives.

### **RESULTS**

Our unique focus on interprofessional education is intended to bridge differences in vocabulary and culture between M.D. and Ph.D students. A significant challenge is the development of measures of key collaborative competencies.

### **CONCLUSIONS**

Antecedent conditions that favor success of the TRT include strong institutional support from the Graduate School of Biomedical Sciences, the School of Medicine, and the Institute for Translational Sciences. The key program champions have formed a strong collaborative team, representing expertise in medical education, program assessment, and basic and translational research.

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**THE CLASSROOM OBSERVATION INSTRUMENT: OBSERVING LEARNING ACTIVITIES IN THE NEXT GENERATION CURRICULUM**

Elizabeth Bradley, Ph.D. University of Virginia Michelle Yoon, Ph.D. University of Virginia Veronica Michaelson, M.D. University of Virginia

**PURPOSE**

The comprehensive evaluation of the University of Virginia's NxGen Curriculum includes observation of learning activities occurring in the learning studio in the new Medical Education Building (MEB). A Classroom Observation Instrument (COI) was designed specifically for use by trained observers.

**METHODS**

The COI consists of six parts, each with a distinct purpose 1) Demographic information, 2) an adaptation of the Active Learning Inventory Tool 3) Innovation Configuration 2 (Integration), 4) Innovation Configuration (Active Learning), 5) Technology and 6) Active Learning/Bloom's Taxonomy. These sections speak directly to specific curricular goals of Active Learning and Integration as well as specific evaluation questions.

**RESULTS**

Trained faculty observers have been using this instrument since the first day the NxGen Curriculum. To date, five observers have collected a total of 359 observations representing 270 unique instructional events. An additional 37 events were not observed leaving 12% of all learning studio events were unobserved. It should be noted that a limitation of this tool is that it is primarily applied in the large group settings thereby underreporting laboratory and small group teaching. This poster illustrates the various components of the COI, including preliminary results from 2010-2011 observations. Additionally, a factor analysis of the Innovation Configuration data is presented as the next step in refining and validating this instrument.

**CONCLUSIONS**

The data collected from direct classroom observations provide a tremendous opportunity for continuous curricular improvement. Given the broad nature of UVA's curricular goals (i.e. Active Learning and Integration) and the importance of these goals to the LCME3 (i.e. ED-5A, ED-33), it is believed this tool may be of use at other institutions.

**REFERENCES**

1 Van Amburgh et. al. (2007). A tool for measuring active learning in the classroom. 2 Hord et. al. (2008). Measuring Implementation in Schools: Innovation Configurations. 3 LCME (2010). Functions and Structure of a Medical School.

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**SIMULATION EXERCISES TO ASSESS COMMUNICATION SKILLS IN INTERPROFESSIONAL EDUCATION-A WORK IN PROGRESS**

Linda Haycraft RN,MSN(R), CPNP, Anthony J. Scalzo, M.D., Aaron D. Robinson, B.S., Daniel R. Whiting, B.S. and Gregory S. Smith, Ph.D. Saint Louis University School of Nursing and Saint Louis University School of Medicine, 1402 South Grand Boulevard, Saint Louis, Missouri 63104

**PURPOSE**

The present study was designed to specifically assess communication skills (CS) between nursing students (NS) and medical students (MS) during joint simulation exercises.

**METHODS**

3 new simulation scenarios were created for this study: an adult patient (P) with supraventricular tachycardia, an adult P with asthma, and child P with febrile seizure. Multilingual and racial diversity were also built into the scenario patient descriptors. Senior (NS) and (MS) will be recruited and those selected will have not participated in similar scenarios beforehand and NS and MS will not be familiar with each other. Each scenario is designed to assess medical CS between members of the health care team based upon established SBAR techniques. (SBAR = Situation, Background, Assessment and Recommendation/Request) This is an established communication paradigm that stresses effective and timely medical CS. Specific checklists were designed which will assess each student's CS during each scenario. CS between NS or MS and the patient, CS between NS and MS themselves and CS between MS and an attending physician will all be assessed. Each parameter will be assessed by direct faculty observation behind a one way mirror using a scale from 0 – 2 (0 = did not complete adequately/correctly, 1 = partially completed/correct, 2 = adequately completed/correct). A summary score for each NS/MS will be recorded and at the end of each scenario they will then undergo debriefing with faculty to explain results and to offer feedback.

**RESULTS**

We have identified sufficient numbers of both NS and MS for inclusion in this study and it is expected to commence in late March. It is anticipated that preliminary results will be available for reporting at the meeting in June.

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**INTEGRATED CURRICULUM IN YEAR ONE: STUDENTS' VIEWS AT UNIVERSITY OF SOUTH FLORIDA COLLEGE OF MEDICINE**

William E. Johnson, Ph.D. Ingrid Bahner, Ph.D. Stanley J. Nazian, Ph.D. University of South Florida College of Medicine USF Health

**PURPOSE**

In 2010-11, the University of South Florida College of Medicine implemented the first phase of a pre-clinical curriculum revision. The first year of pre-clinical clerkship was revised to teach basic science concepts integrating the traditional disciplines into four different courses. The didactic method heavily focused on active learning, both in the small and large group setting. Tests were shorter in length and administered more frequently, and there were weeklong breaks between each course. The first year students were the first to participate in this newly implemented curriculum and we were interested in their opinions about the first year and how the changes affected their academic and professional development.

**METHODS**

Students from three different subgroups of MS 1 (first year students that repeated or were IMS students that had traditional curriculum prior to formal admission to this years changed curriculum, and MS 1 students that had no prior medical school curriculum) were interviewed in focus groups and asked questions related to the changes incorporated in the first year. Student test performances in several areas were analyzed for differences in tests that had similar content from pre-change to post-change.

**RESULTS**

There has been an increase in overall grade scores for each course, when similar topics were analyzed. Student perceptions about the changes reported in focus groups are presently being analyzed. Student post course reviews were generally favorable about the integration and the scheduling.

**CONCLUSIONS**

Overall the consensus is that the new curriculum has had a beneficial effect on student performance and professional development. Student comments will be reviewed and applied as we continue to improve and fine-tune curriculum.

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**EVALUATION OF AN INTERPROFESSIONAL ELECTRONIC HEALTH RECORDS (EHR) SEMINAR SERIES**

Bruce W. Newton\*, Janice K. Hart, Steven E. Boone and the EHR Education Steering Committee, University of Arkansas for Medical Sciences (UAMS), Little Rock, AR, 72205 U.S.A.

**PURPOSE**

UAMS recognized undergraduate health-related students must learn EHR skills to enter the workforce. To begin the educational process, a seminar series was started to introduce EHR, Medical Informatics and Evidence-Based Medicine topics to first year students. The goal is for students to be more familiar with the importance of these topics when they first encounter patients.

**METHODS**

The five UAMS colleges divided their students (ca. 730) into groups assigned to one of four auditoria. To help promote student interaction and interprofessional education, students from each college were in each room. Speaker and panelist presentations were beamed to the other auditoria and off-campus sites. The presentations were recorded. For this pilot project, a variety of presentation modalities were used to determine the most efficient use of presenter and student time. An evaluation tool was designed and electronically sent to all students at the conclusion of each seminar. Likert-scale data and comments were collected and analyzed.

**RESULTS**

Program evaluation revealed the pros and cons of the seminar series. Consistent comments included: the unattractive time of day the seminars were offered and the positive aspect of interacting with students from other colleges. Comments were used to modify the seminar series as it progressed throughout the academic year. The poster will present the various modalities used for presentations, the Likert data and student perceptions.

**CONCLUSIONS**

The positive benefits of the series argue for its continuation. However, additional data are needed to assess its long term impact.

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**FACULTY PERCEPTIONS OF STUDENT EXPERIENCES IN MEDICAL SCHOOL UNDERGOING CURRICULAR TRANSITION**

Syed Ilyas Shehnaz and Jayadevan Sreedharan , Gulf Medical University, Ajman, United Arab Emirates

**PURPOSE**

Gulf Medical College, United Arab Emirates, underwent a major curriculum change from a discipline-based to an organ system-based integrated curriculum. In this context, the present study compared faculty perceptions of the student experiences in the discipline –based curriculum with those in the organ system-based integrated curriculum.

**METHODS**

Data was collected from faculty involved in discipline- based curriculum (FDC) and in the subsequent year from the same faculty involved in integrated curriculum (FIC). The instrument used was the modified Dundee Ready Education Environment Measure (DREEM) questionnaire. Collected data was transferred to PASW-18 .Global, domain and individual item scores were assessed with Wilcoxon Signed Rank test. Percentage agreement, disagreement and uncertainty were assessed by z test for proportion.

**RESULTS**

Total DREEM score was significantly higher ( $p < 0.001$ ) for FIC (139/200) as compared to FDC (119/200). FIC perceived significantly more positive student experiences with the educational environment as indicated by domain scores and item scores. The differences in proportions of agreement between FIC and FDC also reinforced FDC's perceptions of a positive environment as experienced by the students.

**CONCLUSION**

The study showed that the faculty perceived the organ system- based integrated curriculum was providing a better educational environment for the students than the discipline based curriculum.

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**AN INTERPROFESSIONAL EDUCATIONAL FORUM IMPROVES ALLIED HEALTH STUDENT COOPERATION AND TEAMWORK.**

Chad Lairamore, Lorrie George, Kerry Jordan, Kimberly McCullough, and Myra Shock, University of Central Arkansas, Conway AR, 72035

**PURPOSE**

Interprofessional education (IPE) focusing on patient centered care is an emerging trend in health care education. Currently, the evidence to support the efficacy of IPE is lacking. This study examined the impact of an IPE experience on allied health students' readiness, knowledge, and perceptions of working as a team. A ninety minute IPE forum was conducted in which students were divided into small groups and asked to discuss roles, team goals, and outcomes for a case study. Students from nursing, occupational therapy, physical therapy, and speech language pathology participated.

**METHODS**

The Readiness for Interprofessional Learning Scale (RIPLS) and the Interdisciplinary Education Perception Scale (IEPS) were used to survey 173 students before and after the interdisciplinary forum.

**RESULTS**

Data were analyzed using nonparametric statistics with statistically significant differences of  $<0.005$ . There was a significant increase in RIPLS total scores, subscale 1) Teamwork and collaboration, and subscale 2) Professional identity when comparing pre and post scores. There was a significant difference between disciplines' RIPLS scores prior to participating in the interdisciplinary session however after participating this difference was nonexistent. There was also a significant increase in IEPS total scores and all subscale scores 1) Competency and autonomy, 2) Perceived need for cooperation, 3) Perception of actual cooperation, 4) Understanding others values.

**CONCLUSIONS**

Inclusion of an IPE forum was an effective way to introduce students to other allied health disciplines, improve readiness for interprofessional learning, increase knowledge of other professions identity, improve cooperation between disciplines, and facilitate teamwork and collaboration.

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**OUTCOME ASSESMENT OF THE SPECIAL ROUTE OF ENTRY PROGRAM FOR UNDERSERVED AND DISADVANTAGED STUDENTS AT THE COLLEGE OF MEDICINE OF THE UNIVERSITY OF SOUTH FLORIDA**

Ingrid Bahner, Suzanne Jackson, William Johnson, Shirley Smith and Stanley Nazian, College of Medicine, University of South Florida, Tampa FL 33612 USA.

**PURPOSE**

The University of South Florida developed a Master's degree in Medical Sciences program to serve as a special route of entry program into the College of Medicine. Since its inception in 2005, it has gradually transformed into a program to recruit and mentor non-traditional, underrepresented and disadvantaged students for medical school. Low GPA and MCAT scores are typical barriers for these types of students and the curriculum of this Master's degree program is designed to overcome these barriers by giving students the opportunity to master the material of the first year medical curriculum. This abstract describes some of the outcome data for this program including its challenges and success

**METHODS**

Outcome data from the first five classes of this program are available with respect to graduation and matriculation rate. From the last three classes, data are available that include assessment of the individual student's perception of the program, both as quantitative data and narrative data.

**RESULTS**

Since 2006, 74% of the students, who were enrolled in this program matriculated to a medical school accredited in the US. Overall, 20% of these students were either underrepresented or disadvantaged, however, this success rate increased significantly during the last two years of this program, achieving a 37.5% and 50% matriculation rate, respectively. Qualitative data is currently being analyzed with the goal to identify the reason(s) for this increase and to identify areas of improvement.

**CONCLUSION**

The Special route of entry Master's degree program of the University of South Florida has achieved an increase in the matriculation of underrepresented and disadvantaged students. The challenges include to further increase the matriculation rate.

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**A CURRICULUM TO USE SIMULATION EXERCISES TO ASSESS MEDICAL COMMUNICATION SKILLS IN INTERPROFESSIONAL EDUCATION (IPE)-A WORK IN PROGRESS**

Linda Haycraft RN,MSN(R), CPNP<sup>1</sup>, Anthony J. Scalzo, M.D.<sup>2</sup>, Aaron D. Robinson, B.S.<sup>2</sup>, Daniel R. Whiting, B.S.<sup>2</sup> and Gregory S. Smith, Ph.D.<sup>2</sup> Saint Louis University School of Nursing<sup>1</sup> and Saint Louis University School of Medicine<sup>2</sup>

**PURPOSE**

The present study was designed to specifically assess communication skills (CS) between nursing students (NS) and medical students (MS) during joint simulation exercises.

**METHODS**

3 new simulation scenarios were created for this study: an adult patient (P) with supraventricular tachycardia, an adult P with asthma, and child P with febrile seizure. Multilingual and racial diversity have also been built into the scenario patient descriptors. Senior (NS) and (MS) will be recruited and those selected will have not participated in similar scenarios beforehand and NS and MS will not be familiar with each other. Each scenario is designed to assess medical CS between members of the health care team based upon established SBAR techniques. (SBAR = Situation, Background, Assessment and Recommendation/Request) This is an established communication paradigm that stresses effective and timely medical CS. Specific checklists were designed which will assess each student's CS during each scenario. CS between NS or MS and the patient, CS between NS and MS themselves and CS between MS and an attending physician will all be assessed. Each parameter will be assessed by direct faculty observation behind a one way mirror using a scale from 0 – 2 (0 = did not complete adequately/correctly, 1 = partially completed/correct, 2 = adequately completed/correct). A summary score for each NS/MS will be recorded and at the end of each scenario they will then undergo debriefing with faculty to explain results and to offer feedback.

**RESULTS**

We have identified sufficient numbers of both NS and MS for inclusion in this study and it is expected to commence in late March. It is anticipated that preliminary results will be available for reporting at the meeting in June.

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## **IMPROVED LEARNING OUTCOMES FOLLOWING ASSESSMENT MODIFICATIONS IN AN INTEGRATED MEDICAL CURRICULUM**

Gregory Asimakis, Michael Ainsworth, Judith Aronson, Ann Frye, Steven Lieberman, and Jeffrey Rabek, University of Texas Medical Branch, Galveston, TX, 77555, U.S.A

### **PURPOSE**

This abstract describes the stimuli and rationale for and the nature of assessment changes implemented after embarking on a new student-centered, problem-based learning curriculum.

### **METHODS**

In 1998, the University of Texas Medical Branch implemented the Integrated Medical Curriculum (IMC), a problem-based curriculum consisting of clinically relevant, interdisciplinary basic science courses and a concurrent Practice of Medicine course. The aim was to improve educational quality by emphasizing knowledge retention, problem-solving skills, integration of relevant concepts, early acquisition of clinical skills, and teamwork. During the initial years of the IMC, students' learning outcomes did not improve. We thought this was due to not initially modifying student assessment to align with the new curricular goals and philosophies. We subsequently took several steps to modify our assessment. These steps included (1) increasing the number and quality exam questions, (2) sequestering exams, (3) increasing the number of practice exam items in each course, and (4) emphasizing in-depth discussion in problem-based learning sessions by introducing small-group quiz exercises.

### **RESULTS**

After these modifications, our students' USMLE Step 1 scores and pass rate rose from consistently below the national average to consistently (for the past 7 years ) above the national average.

### **CONCLUSIONS**

We believe that implementing those assessment modifications within the framework of the newly devised problem-based curriculum in an interdepartmental environment resulted in a critical mass of "local" changes. These changes (initiated and supported by students, faculty and administration) catalyzed, produced and sustained more "global" changes that improved students' learning.

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**A TAGGED ELECTRONIC DATABASE OF EXAM QUESTIONS (TEDEQ) AS A TOOL FOR STUDENT SELF-EVALUATION**

Dr. Dale D. Vandre, Dean of Foundational Sciences Ohio State University College of Medicine Mr. Eric Ermie, Program Coordinator for Assessment and Evaluation, Ohio State University College of Medicine

**PURPOSE**

Multiple choice examinations are often used to assess medical student performance, and several thousand exam items are used during preclinical education. Thus, it is difficult for a student to evaluate their performance in different topics that are often assessed together on the same exam or across the curriculum longitudinally. To address this problem, we developed a question tagging system that enables us to provide students with more useful performance information.

**METHODS**

Categories specifying exam items were defined after considering curricular structure, cognitive classification, and curricular objectives. The defined categories were then converted into a numerical tag for each question. The coded information was incorporated into an electronic database using features of the categorization tools of SofTeach, a module of the ExamSoft test management system. Using the TEDEQ system a numerical code was then assigned to all multiple choice questions used in the curriculum.

**RESULTS**

Students can view a breakdown report of their individual performance in every category that was applied to the exam by logging into a website after each exam. The individual student's performance data can also be readily plotted in comparison to class average performance. As the student progresses through the curriculum a cumulative average across exams can also be generated. Individual student performance reports can also be generated for the faculty to review as necessary for academic advising or in cases of a student needing remediation. Conclusion: The exam category breakdown reports provide useful performance feedback to the students and faculty instructors. Reports can be used to guide student remediation, study habits, and direct curricular modification.

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## **ASSOCIATION BETWEEN A CASE-BASED WRITING EXERCISE AND NORTH AMERICAN VETERINARY LICENSE EXAM® SCORES**

Fales-Williams A <sup>1</sup>, Whitley E <sup>1</sup>, Wu T-F <sup>2</sup>, Gustafson M <sup>2</sup>, Kirk R <sup>2</sup>, Danielson J <sup>1,2</sup> <sup>1</sup> Department of Veterinary Pathology, <sup>2</sup> Office of Curricular and Student Assessment, College of Veterinary Medicine, Iowa State University, Ames, Iowa 50011-1250, USA

### **PURPOSE**

The North American Veterinary License Exam® (NAVLE) is a measurement of entry-level veterinary medical knowledge and is required for licensure to practice in the U.S. The CCA is a writing assignment that tests students' ability to narrate, illustrate and synthesize ante mortem and post mortem data from a medical record. The paper is graded on a 21-item rubric, with 5 levels of achievement. We postulated that CCA scores and/or individual CCA rubric items would have similar trends to NAVLE performance.

### **METHODS**

The 2010 CCAs produced by 120 fourth year students were scored year-round by two raters, with intra class correlation of 0.72. Cronbach's coefficient alpha scores were determined for all 5 CCA subscales. Correlations were calculated between NAVLE scores and CCA scores and subscores. Regression analysis was used to determine the extent to which sub-scales predicted NAVLE scores.

### **RESULTS**

Two sub-scales, "Educational Impact" and "Thoroughness of correlation" had appropriate internal consistency (>0.7). One sub-scale, Thoroughness of Correlation, and three CCA items, Depth and Accuracy: Differential Diagnosis; Thoroughness of Correlation: Connection; and Thoroughness of Correlation: Theories; significantly, though modestly correlated with NAVLE scores. Regression analysis was not significant.

### **CONCLUSIONS**

Overall, CCA scores were not predictive of NAVLE success, though the lack of variability within CCA scores impairs the statistical strength of this comparison. Nonetheless, students that passed the NAVLE also scored well on several CCA rubric items. It is possible that those CCA items and scales that produced adequate reliability were measuring one or more veterinary competencies that, while not measured by the NAVLE, are still of potential importance.

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### **PREDICTOR MODEL FOR BOARD SUCCESS RATE**

John George, Ph. D.(ATSU/KCOM), Melanie Davis, MA(ATSU/KCOM), Scott Olsen, Ph.D.(Truman), Susan Coon, MA(ATSU/KCOM), Stephen Laird, D.O.(ATSU/KCOM)

### **PURPOSE**

The purpose of this research was to develop a model for predicting Comprehensive Osteopathic Medical Licensing Examination (COMLEX-USA) Level 1 scores and probability of failure. Studies have shown there is a relationship between academic performance and pre-admission variables and performance on COMLEX Level 1. 1, 2 The objective of this study was to determine if a comparable relationship exists at this institution; and, then to seek a model for the prediction of COMLEX scores that could be useful in the identification of students at risk for failure.

### **METHODS**

All pre-admission data, course grades, and COMLEX Level 1 exam scores were gathered for the classes of 2007-2011. Multiple regression methods, using maximum R-square criteria, were used to obtain a predictive model for COMLEX scores, which was then cross validated with a random holdback sample.

### **RESULTS**

Standardized grades in Biochemistry I, Anatomy I, and Histology I were the courses most predictive of COMLEX Level 1 scores Total MCAT score and undergraduate science grade point average (g.p.a.) were the strongest pre-admission variables, which were added to strengthen the model. Rsquare values were as follows for the five variables independently: total MCAT, 0.0579; science g.p.a., 0.0782; Histology I, 0.3395; Biochemistry I, 0.3408, and Anatomy I, 0.3793. The combined rsquare value for the three course grades was 0.4661, while the combined rsquare value for all five variables was 0.4985.

### **CONCLUSION**

The results of this research are currently being used with year's first-year students to identify students who are at risk for failing COMLEX Level 1. By identifying potential failures early, interventions may be offered in an effort to prevent failure on this high-stakes exam.

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## **USING AUDIENCE RESPONSE QUESTIONS TO ASSESS STUDENT PREPARATION FOR A YEAR 1 NEUROSCIENCE COURSE**

Samuel Saporta and Frazier Stevenson, University of South Florida College of Medicine, Tampa, FL 33612, U.S.A.

### **PURPOSE**

Little data exists regarding the level of student preparation and successful completion of the first year of medical school. In an attempt to assess how student educational background affected student performance, we used audience response questions to determine specific student background as part of active learning sessions in the year 1 Medical Neuroscience and Endocrinology course.

### **METHODS**

The TurningPoint Audience Response System was used to assess the educational background of 133 first year medical students and 33 Doctor of Physical Therapy (DPT) students. Students were asked whether they had an advanced degree and/or had previously taken a course in neuroscience. Responses were analyzed against final course grade. Complete data were collected for 119 medical and 33 DPT students. The non-parametric Spearman Rho Correlation and Wilcoxon Rank Sign Test for paired data were used to determine covariance and statistical significance.

### **RESULTS**

There was a statistically significant covariance between students who had an advanced degree and final course grade ( $Rho=0.2861$ ;  $p<0.0001$ ). Similarly, course performance significantly covaried with students who previously had a neuroscience course ( $\rho=0.2165$ ;  $p=0.0001$ ). The performance of DPT students with advanced degrees ( $\rho=0.5050$ ;  $p=0.0001$ ) or who had previously had a neuroscience course ( $\rho=0.3158$ ;  $p=0.0001$ ) also covaried with final course grade.

### **CONCLUSIONS**

These data suggest that prior exposure to the neurosciences or to graduate courses enhances student performance in a first year Medical Neuroscience course. Moreover, the use of an audience response system may be useful in correlating student educational background with active learning session performance and overall course performance.

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**THE CREDIT RATE OF STUDENT ACHIEVEMENT LEVEL ON ASSESSMENT OF FACULTY MEMBERS**

Dr. Majid Zare Bidaki, assistant professor, Birjand University of Medical Science, Birjand, Iran. Dr. Mohammad Abedini, assistant professor, Birjand University of Medical Science, Birjand, Iran. Ali Rajabpour Sanati, Medical student, Birjand University of Medical Science, Birjand, Iran. Najmeh Mobasheri, Khavaran University, Mashhad, Iran.

**INTRODUCTION**

Ongoing monitoring of faculty members is a usual manner to evaluate their teaching quality, academic abilities, interaction with students and observance of the proper standards. One of the common resources for evaluating faculty members is using student-filled questionnaires, however the rate we can credit the students' opinions on their educators is controversial. The aim of this study was to know any correlation between student achievement levels and the students' point view on their educators.

**METHOD**

In this descriptive - analytical study 19 faculty members and 190 students (first to third year students of science laboratory technology and anesthesiology) were included. The data were collected based on student-filled questionnaire. The validity and reliability of questionnaire was previously confirmed by the Education Development Center (EDC) of Birjand University of Medical Science. In addition, the total average score of each student was collected and the students were classified into low, medium and strong groups based on their total average scores. The Data were then analyzed using SPSS software to see if there is any correlation between the students' total average scores and the type of their answers to the questionnaire.

**RESULTS**

According to this study no correlation was found between the students progress levels and their viewpoints to their educators ( $P = 0.05$ ).

**CONCLUSION**

This study comments on the importance and accuracy of students' point view with any level of academic achievement despite some problems and limitations. It is also recommended using complementary methods to increase credibility of faculty members evaluation process.

Keywords: Evaluation, faculty members, students, achievement level

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**USE OF COMPETENCIES TO INSURE DISCIPLINE PROFICIENCY IN AN INTEGRATED, ORGAN BASED CURRICULUM**

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**PURPOSE**

Faculty in discipline-based curricula resist changing to integrated curricula. Their concerns include the fear that a student in a multi-disciplinary course will achieve a passing score with good performance in one discipline and poor performance in another. To alleviate these concerns, we have incorporated science competencies into the first year of our new curriculum.

**METHODS**

The first year curriculum consists of 4 separately graded 8-9 week courses. All include some elements of Anatomy, Behavioral Medicine, Biochemistry, Cell Biology, Genetics, Molecular Biology, Neuroscience and Physiology. A year long course titled Doctoring 1 incorporates beginning clinical competency. Also running across the entire year, spanning the individual courses, are Basic Science Competencies: Molecular, Structural, Neurobehavioral and Functional. As tests are developed for the individual courses, a question is assigned to one or more of these competencies. A Competency Director is charged with monitoring performance and reporting to the students after each individual course. Students, even though passing the individual courses, will not be allowed to advance to the second year unless they have demonstrated competence in these areas.

**RESULTS**

After the completion of 2 courses no student has failed an individual course. All but 2 medical students are currently above the minimum proficiency level in all of the Competencies. End of year data will be available at the meeting.

**CONCLUSION**

The use of discipline based competencies in an integrated curriculum permits the development of true integration, while insuring that discipline based knowledge and skills are adequately demonstrated by the individual student and reassuring discipline-based faculty that core knowledge is not lost.

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## **A PRE-MATRICULATION PROGRAM IN HISTOLOGY TO IMPROVE THE ADJUSTMENT OF STUDENTS TO MEDICAL SCHOOL**

Craig. A. Canby<sup>1</sup>, Wayne A. Wilson<sup>2</sup>, Matthew K. Henry<sup>3</sup>, Jeffrey T. Gray<sup>4</sup>, Glenna Ewing<sup>5</sup>, Edward P. Finnerty<sup>2</sup>, and Jamie Rehmann<sup>6</sup> Departments of Anatomy<sup>1</sup>, Biochemistry & Nutrition <sup>2</sup>, Physiology & Pharmacology <sup>3</sup>, Microbiology & Immunology<sup>4</sup>, Academic Quality & Medical Education Research<sup>5</sup>, and Enrollment Management<sup>6</sup>, Des Moines University, Des Moines, IA

### **PURPOSE**

The transition from undergraduate school to the first year of medical school presents significant challenges to many students as they academically acclimate to an intense curriculum. To ease the transition, we chose to develop an online pre-matriculation program, 'The DMU Primer', at Des Moines University. We asked if we could detect any increase in student performance that could be attributed to use of the pre-matriculation materials and also whether students who made use of the materials felt that they had achieved any learning gains. We report on the influence of the DMU Primer on student performance in the cell and tissue biology (CTB) course.

### **METHODS**

A CTB Primer module was prepared and hosted on the University's ANGEL® server. Student access to the Primer was dependent upon completion of a pre-test. This unlocked access to additional Primer material. The students' use of the ANGEL® site was recorded, allowing comparison of the academic performance of students who made use of the site and students who did not. Appropriate statistical tests were performed using SPSS 17.0, with  $\alpha=0.05$ .

### **RESULTS**

Sixty-eight percent of the Primer group scored greater than the mean on exam 1 versus 57% of students who did not access the material. With respect to the final course grade, 68% of the Primer group scored higher than the mean versus 55% of the non-Primer group. These results did not achieve statistical significance. Sixty-nine percent of the students thought the Primer was helpful to very helpful for their learning preparedness in medical school.

### **CONCLUSIONS**

There was a negligible trend towards improved performance in CTB associated with use of the Primer materials and those students who elected to utilize the Primer materials perceived some benefits from their use.

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**QUALITY CONTROL IN MEDICAL STUDENTS' REPORTING**

Benjamin L (1), Cooles P (1), Benjamin G (2) Dept. of Introduction to Clinical Medicine, Ross University School of Medicine(1); Princess Margaret Hospital, Dominica (2)

The quality of medical education programs is evidenced by the accurate reporting of patient's history and physical examination by medical students. These core clinical skills and competencies are critical for patient care. The Association of American Medical Colleges (AAMC) recommends that "medical schools adopt an explicit, developmental approach to the design of the skills education curriculum, including expected levels of skills performance proficiency throughout the four-year curriculum". At Ross University School of Medicine (RUSM) students are introduced to history taking and physical examination in the preclinical years. These competencies are reinforced through various levels of exposure to standardized, simulation, and real patients. Students are also required to submit written reports.

**PURPOSE**

To determine the effectiveness of quality control measures (Turnitin program for screening students' papers and subsequent review) in improving medical students' reports.

**METHODS**

A cross-sectional retrospective study was conducted for the period September 2009 to December 2010. Originality reports from Turnitin were reviewed and those reports with similarity index above 25% were noted. Significance was determined at  $p < 0.05$  using Chi-squared.

**RESULTS**

Comparing periods, (May –August 2010 with September to December 2010), the similarity indices decreased for each of the semesters ( $p < 0.05$ ), when using standardized patients. However surprisingly, the actual numbers for the similarity indices increased from semester 2 to semester 3. This was possibly due to confounding factors such as students' use of their own previous report or use of an available template. Reports by semester 3 students on real patients trended downwards over the period September 2009 to December 2010. However, semester 4 students showed an increase for the same period. Confounding factors, such as the use of students' own reports from earlier semesters influenced this increase.

**CONCLUSIONS**

Turnitin is a valuable screening instrument in detecting similarities in history and physical scripts by medical students. However, additional measures such as review and discussion of scripts with students and faculty are also important for ensuring in quality control. Reference: Recommendations for Clinical Skills Curricula for Undergraduate Medical Education. Association of America. Medical Colleges (AAMC), 2005.

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**CRITICAL THINKING INCREASES AMONG INITIALLY LOW CRITICAL THINKERS AFTER ONE YEAR OF MEDICAL SCHOOL**

Kevin D. Phelan, Carol R. Thrush and Bruce W. Newton, University of Arkansas for Medical Sciences, Little Rock, AR 72205, USA.

**PURPOSE**

Modest increases in critical thinking (CT) skills were reported after three years of medical school using the Watson-Glaser Critical Thinking Assessment (WGCTA) (Scott et al, 1998). However, this study was limited to a single class of students and did not identify the population that exhibited increases in CT skills.

**METHODS**

This paper reports on the findings of a multi-year study of three successive classes of medical students (2008-2010) and the relationship between academic performance and changes in CT skills (from freshman orientation to sophomore registration).

**RESULTS**

Although there was no significant change in CT skills for the entire group of students ( $66.0 \pm 0.3$  vs  $65.8 \pm 0.4$ , mean  $\pm$  SEM;  $n=340$ ) ( $p>0.05$ ), there were distinct differences when comparing the performance of initially high CT (top 1/5th), average CT (middle 3/5ths) and low CT (bottom 1/5th) groups of students. High CT students showed a significant decline from  $73.7 \pm 0.2$  to  $72.5 \pm 0.5$  ( $n=62$ ) ( $p<0.05$ ). Average CT students also exhibited a similarly small but significant decline ( $p<0.05$ ). In contrast, the performance of low CT students significantly increased from  $55.9 \pm 0.5$  to  $57.8 \pm 0.9$  ( $n=64$ ) ( $p<0.05$ ) with the greatest changes occurring in the WGCTA subtests of inference, deduction and assumption. We reported last year that the majority of students with initially low CT skills were actually high academic performers. In this study, the high academic performers in the group of initially low CT students generally exhibited CT increases compared to those with low academic performance.

**CONCLUSIONS**

This study reveals that initially low CT students exhibit significant increases in CT skills after only one year in medical school and this appears to correlate with their academic performance.

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**USING COMPETENCY ASSESSMENT TO INCREASE STUDENT SELF AWARENESS IN PBL EXERCISES**

Nancy Howell and India Lane, The University of Tennessee College of Veterinary Medicine, Knoxville TN, 37996, U.S.A.

**PURPOSE**

Since 1999, six one-week problem-based learning (PBL) cases are integrated into the University of Tennessee's pre-clinical veterinary curriculum. Recent alignment of competency assessment in the clinical and pre-clinical phases of the educational program now allows students to rate their own performance and progress using a rubric similar to that used by their facilitators. This study reviews initial results of the first year of this alignment.

**METHODS**

In 2010, a clinical competency rubric was developed to assess veterinary student clinical performance in competency domains required of the veterinary accrediting body. The online rubric consists of 20 items rated by clinicians during students' clinical preparation. As part of this project, similar rubrics were developed for facilitator grading of PBL students and for PBL students to rate themselves in 13 of the 20 competency areas.

**RESULTS**

Students generally rated themselves lower than facilitators rated them. Mean facilitator rated student performance fell in the excellent category for five of the 13 competencies: treatment planning, knowledge assimilation, communication of biomedical information, communication with simulated clients and overall professionalism. Students rated themselves as excellent in only one of the competency areas, professionalism.

**CONCLUSIONS**

Continued analysis of this data will include assessment of facilitator/student paired ratings with the individual facilitator to determine variance patterns. results will direct efforts to improve students' ability in self-assessment. Competencies with weaker ratings, both self-assessed and facilitator-assessed, will also be identified to provide opportunities for student and curricular improvement.

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**INTEGRATION OF ANATOMY, HISTOLOGY, AND EMBRYOLOGY INTO ONE COURSE USING TEAM-BASED LEARNING (TBL)**

Grace Pinhal-Enfield, David DeFouw, and Nagaswami Vasan, University of Medicine and Dentistry of New Jersey, Department of Cell Biology and Molecular Medicine, New Jersey Medical School, Newark, NJ 07103 U.S.A.

**PURPOSE**

We set out to develop a single integrated Anatomy, Cell Biology, and Embryology (ACE) course from two formerly separate courses (anatomy and histology) using Team-Based Learning (TBL). This abstract describes the development of ACE using TBL.

**METHODS**

Because TBL provides a platform for instructor-derived focus of concepts for students, we developed TBL modules that integrated principal concepts of anatomy and histology. These TBL modules incorporated learning objectives derived from anatomy, embryology, and histology textbook references, virtual microscopy images, and cadaveric dissection.

**RESULTS**

We chose TBL as a strategy to promote integration because it switches learning from an instructor-driven delivery of concepts to passive student passengers into a student-driven educational expedition that leads to active, lifelong learning. TBL also provides a platform for the engagement of students, who become accountable for their learning by the necessity of advanced preparation and subsequent delivery to their peers in team discussions of anatomical, histological, and embryological concepts that apply to clinical vignette problem solving.

**CONCLUSIONS**

Anatomy is often artificially subdivided in the medical school curriculum into gross (macroscopic) anatomy and histology (microscopic anatomy). Integration of these fields allows students to follow a natural progression of learning in which there is observation and dissection (gross anatomy), analysis of components (histology), and consideration of structural formation (developmental anatomy/embryology). In addition to following a natural progression for learning anatomy, integration allows for reinforcement and correlation of knowledge that can subsequently be used to address clinical applications.

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**TEAM-BASED LEARNING EXERCISES AS A METHOD OF INTEGRATION BETWEEN TRADITIONAL DEPARTMENT-BASED SECOND YEAR COURSES**

Donald E. Wheeler, MD, University of South Florida College of Medicine, Departments of Pathology & Cell Biology and Internal Medicine Susan Pross, PhD, University of South Florida College of Medicine, Department of Molecular Medicine Charles Preuss, PhD, University of South Florida College of Medicine, Department of Molecular Pharmacology & Physiology Ingrid Bahner, PhD, University of South Florida College of Medicine, Department of Molecular Medicine

**PURPOSE**

There is an increasing emphasis on horizontal integration between separate courses at institutions with a more traditional departmental-based structure. Innovative methods are needed to cross the divide between these courses in order to achieve true integration of objectives and information. We describe how the Team-Based Learning (TBL) format is used to achieve a level of course integration between such traditional units.

**METHODS**

The course directors from four traditional department-based courses (Principles of Medical Immunology and Infectious Diseases, Pharmacology, Pathology and Laboratory Medicine and Evidence Based Clinical Practice) meet to define a broad, important subject area of interest to all the courses. Each course director selects a variety of short articles in that subject area, and then the directors meet to choose one article from each course that the group feels best integrates with the others and exemplifies a relevant topic in the subject area. Then, specific learning objectives are developed for each article and reviewed by the course directors to maximize integration of the topic. Following the conventional TBL format, questions are formulated from each article using the objectives to construct the IRAT/GRAT component of the TBL exercise. Following this, a series of sequentially unfolding cases is developed based upon the articles as the second part of the TBL exercise. Working together, the course directors develop questions, again based on the article objectives, that occur at various points in the unfolding cases that the students discuss and answer in the traditional TBL format. Answers to the IRAT/GRAT and case-based questions are recorded on Scantron sheets distributed to the students and returned for scoring.

**RESULTS**

Using this integrative method, a TBL-based learning module on "Chronic Kidney Disease" was created in 2008. Generally well received by the students, in the ensuing years, other modules were created in "Chronic Liver Disease," "Immunodeficiency and Neoplasia," and "Perinatal Diseases." Topics chosen for future development include "Metabolic Syndrome." Student reaction to the modules has been mixed. Some have appreciated the TBL method of learning and enjoyed the collaborative modules, while others have viewed the amount of information to master as excessive.

**CONCLUSIONS**

Using a conventional TBL-based method is an excellent platform for enhancing integration efforts between traditional department-based second year courses at USF. However, it is very time-consuming, requiring numerous hours of faculty time to ensure that, for example, overall topics are broad and of recognized educational interest, objectives are specific and integrative, and that questions developed for the IRAT/GRAT and cases are not narrow, but emphasize general principles outlined by the objectives.

**MEDICAL STUDENT PERCEPTIONS OF INTEGRATING PBL AND GROSS ANATOMY**

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**PURPOSE**

A hybrid curriculum consisting of PBL, small group learning, didactics and laboratory activities often lack pragmatic continuity of educational experiences. In this study, we ascertained student opinions of PBL's role in the medical curriculum and the effectiveness of integrating with anatomy.

**METHODS**

Student teams were asked to answer, without faculty assistance, PBL integration questions at the end of lab exercises in five of eight sessions. We solicited for volunteers via e-mail to participate in a focus group evaluating PBL integration into anatomy. Eleven students from across the three lab classes participated. A non-investigator faculty member conducted the 1-hr semi-structured focus group. Questions focused on the role of PBL in the curriculum and students' awareness of integration, experiences and opinions. Proceedings were recorded (students' identification were anonymous) and transcribed.

**RESULTS**

Students expressed that PBL was an important feature of the overall curriculum, helpful for learning lecture material in greater depth, and essential for teaching active and critical learning, teamwork, and literature search skills. Regarding integration with anatomy, students would appreciate a didactic approach to integration questions throughout lab exercises with a discussion of the answers at the end of class and standardized instruction by tutors on follow-up PBL sessions. Students expressed interest in having PBL integrate over all curriculum activities.

**CONCLUSIONS**

Student perceptions of an integrated curriculum can be an informative element in curriculum design and assessment. Moving forward, PBL integration will necessitate careful planning and would benefit from student input.

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### **EFFICACY OF TBL IN PBL CURRICULUM**

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### **INTRODUCTION & PURPOSE**

College of medicine in University of Sharjah, United Arab Emirates was established in 2004 with partnership of the faculty of medicine, Monash University, Australia. It has six year educational program including one year of pre medical foundation. The college has envisioned student centered community oriented problem base curriculum. Recently we have introduced team based learning (TBL) system in order to seek its efficacy in our present PBL (problem based learning) curriculum.

### **METHODS**

In our present study we are comparing the same group of year two students being assessed by two variant of TBL. In pre-resource session TBL the students were assessed individually as individual-readiness assurance test (IRAT) and in group as group readiness assurance Test (GRAT) for knowledge of objectives of that particular week. In post resource session TBL the same strategy was adopted after covering the objectives of the week in resource sessions. The study involved second year students during their Cardiovascular/ Respiratory (8 weeks) and Hematology courses (8 weeks). The first 8 weeks of the course were assessed as pre resource session TBL and the last 3 weeks as post resource session TBL.

### **RESULTS**

In pre and post resource session TBL performance for individual was 40.3% and 52.3% ( $p < 0.05$ ) respectively. Same trend was observed for the group performance 70.4% vs. 82.3% ( $p < 0.05$ ). Comparing between the pre and post resource session TBL, we found that individual student and group performance was better in the later ( $p < 0.01$ ).

### **CONCLUSION**

We strongly recommend the post resource session TBL in the perspective of PBL curriculum. Further studies are needed to confirm our present observations.

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## **NO MORE LECTURES: A NOVEL APPROACH TO TEACHING PHARMACOLOGY IN AN INTEGRATED PBL ENVIRONMENT**

Patricia C Rose, Hofstra North Shore-LIJ School of Medicine

### **PURPOSE**

To design a curriculum that enables students to learn basic and clinical pharmacology concepts using a non-lecture based pedagogy driven by clinical cases.

### **METHODS**

In a traditional pharmacology course students typically struggle to recall basic concepts needed for application in a clinical setting. Hofstra North shore-LIJ School of Medicine (SOM) is adopting a pharmacology curriculum that will be learned through the use of innovative techniques that facilitate active learning. Beginning with the first course and extending through the first two years students will use clinical cases to learn basic pharmacology and its applications (therapeutics). PBL, TBL, simulation, web based resources and podcasts are alternative

### **METHODS**

to deliver content to students. In classroom participation as well as weekly and end of course assessments will be conducted to gauge the student's progress. Knowledge acquired by students will be assessed in small group using clickers and essay type questions.

### **RESULTS**

Comparison of USMLE scores at our SOM to scores from students learning in a traditional lecture based pedagogy. Assessments may also include feedback on student performance while on clinical rotations from preceptors. Lessons learned: It is evident that an active learning environment facilitates critical thinking. It ought to be easier for students to approach their clinical rotations with an excellent working knowledge of pharmacology and therapeutics that will follow them into to their clinical experience.

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**INCREASING ACTIVE LEARNING OF METABOLIC BIOCHEMISTRY TOPICS THROUGH THE TBL FORMAT**

David S. Franklin, PhD Tulane University Health Sciences Center, School of Medicine, Biochemistry Department, 1430 Tulane Avenue, New Orleans, LA 70112

**PURPOSE**

Team-based learning shifts the roles of education from a passive lecture format by an instructor, to active application of course material by student teams. This enables students to self-teach themselves and their team members, providing a more concrete form of active learning, holds students responsible for their understanding, and shifts their emphasis from passive learner to active participants.

**METHODS**

Over the past two years at Tulane University School of Medicine, eight Metabolic Biochemistry course lectures have been converted to an active-learning TBL format, including two amino acid metabolism lectures, two nucleotide metabolism lectures and four diabetes lectures. The genesis of this began with several TBL workshops to learn the TBL process; how to cover metabolic pathways and complex topics such as Inborn Errors of Metabolism or Diabetes in a traditional TBL format. The amino acids and nucleotides lectures were each converted into 2-hour TBL sessions, consisting of IRAT/GRAT and GAE case study questions. The diabetes lectures were converted into two 2-hour TBL sessions, each with a different set of learning objectives.

**RESULTS**

These four TBL sessions were recently completed. As anticipated, there was a statistically significant increase in the team-based GRAT scores, compared to the individual IRAT scores ( $p < 0.0001$ , for all four TBL sessions). The results from the team-based GAE case study questions were also similarly high. TBL topics were also assessed in a multiple choice block examination. Although all statistically insignificant ( $p > 0.05$ ), exam scores increased for the amino acid and diabetes topics, and decreased for the nucleotide topic (comparing TBL vs. lecture exam scores).

**CONCLUSIONS**

Overall, student evaluations were positive, appreciating the change to active learning. Our results and student evaluations suggest how these TBLs may be further improved for future use.

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## **INTRODUCTION OF TEAM-BASED LEARNING SESSIONS INTO AN INTEGRATED, PBL HYBRID MEDICAL CURRICULUM**

Thomas Hill, Ph.D., Linda Olson, Ed.D., Kurt Borg, Ph.D., Patrick Carr, Ph.D., Kenneth Ruit, Ph.D., Nancy Vogeltanz-Holm, Ph.D. University of North Dakota School of Medicine and Health Sciences, Grand Forks, North Dakota

### **PURPOSE**

A Problem Based Learning (PBL) hybrid curriculum was introduced at our medical school to improve students' ability to function in a group. In PBL, students identify gaps in their knowledge and correct these deficiencies through self-directed learning. Although group participation is important in PBL, the environment does not fit the model of true team learning. Team Based Learning (TBL) offers students an opportunity to work together toward a common goal with each student contributing toward that goal. To foster more effective teamwork skills in students, a TBL pilot study was conducted within the context of our existing PBL hybrid curriculum.

### **METHODS**

TBL activities that complemented the patient case studies used in our PBL small groups were incorporated for two weeks. At the end of each week, students worked within their regular groups to complete Individual and Group Readiness Assurance Tests that covered topics from weekly lectures and the PBL case study. Students then worked in teams to answer questions from a series of clinical scenarios relevant to topics covered during the week of instruction. The small groups convened in a lecture hall as a class, reviewed the questions, reported their answers simultaneously, and discussed answers with faculty content-experts.

### **RESULTS**

Students' scores on selected end-of-block exam questions showed a significant increase during the two week TBL pilot study. Student comments also indicated that they learned topics at a deeper level during the TBL weeks compared to the PBL-only weeks.

### **CONCLUSIONS**

Based on the success of the initial pilot study, a similar PBL-TBL study will be expanded to an eight-week block during 2011, with the goal of eventually expanding this format to cover most of Year 2 of the medical curriculum.

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## **TWELVE YEARS OF "THIN-SLICE" PROBLEM BASED LEARNING: EVOLUTION OF COURSES IN A VETERINARY CURRICULUM**

India Lane, Nancy Howell, and James Brace. The University of Tennessee, Knoxville TN, 37996, U.S.A.

### **PURPOSE**

During a curricular revision in the late 1990s, we implemented a series of one week PBL and early clinical experience (ECE) courses interspersed ("sliced") throughout the preclinical curriculum. The courses were designed to improve integration of curricular content; encourage student curiosity, responsibility and self-directed learning; and improve communication skills. We illustrate how the flexible course format has changed over the years in response to student and stakeholder needs and feedback.

### **METHODS**

Course reviews, student assessments, faculty surveys and focus group sessions

### **RESULTS**

PBL cases have been revised to reflect current biomedical information and new challenges to veterinarians. Communication training has been incorporated into the courses, with the completion of modular content and the addition of simulated clients. Written exercises now build from reflective journals (first year) to a case report (second-year) to problem oriented simulated progress notes (second and third year) as students work through the curriculum. Completion of medical records has been incorporated, including sample submissions, client communications, progress notes and discharge instructions. Most recently, additional professional skills sessions, coaching sessions and a competency based grading rubric have been added to the PBL/ECE weeks. Student interest in "paper" cases declines and interest in challenging hands-on, clinical experiences increases during the curriculum. Future plans include a significant reorganization of the final PBL week to include multiple rapid clinical presentations.

### **CONCLUSIONS**

The week-long course format allows the continual and rapid modification needed to meet new and changing curricular demands from various stakeholders

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**GROUP TESTING AS A FORM OF TEAM BASED LEARNING: ACCEPTANCE AND EFFECT ON STUDENT PERFORMANCE**

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**PURPOSE**

In group testing students retake exam questions in a group after submitting individual answers. Variants have been used in other settings, but the effects have not been extensively studied in medical schools. We examined the effects of group testing on exam performance using two methods of answer submission and surveyed students on individual learning and group dynamics.

**METHODS**

Year 1 and 2 students took exams individually. Approximately 30 minutes later randomly assigned groups retook the identical test. Performance on the group test counted 5-10% of the test score. In most years, groups were required to submit a consensus answer. In some years students were permitted to submit answers independent of the group consensus. Current year 1 and 2 students were surveyed anonymously about group dynamics, learning, and satisfaction.

**RESULTS**

Students scored higher after discussing the questions (Consensus: 12.5%; Independent: 11.4%). When the same cohort of students was allowed to submit an independent answer one year, then required to achieve consensus the next, the comparative improvement in their performance after discussion did not change (Independent 11.4%; Consensus: 11.7%). 83.1% of students reported teaching during the group exam. 65.1% reported groups achieve unanimity "often". 79.1% reported group testing reinforced class material. 56.4% reported feeling pressured by peers. Group testing was considered worthwhile by 34.2%; 38.6% felt group exams should be continued.

**CONCLUSION**

Group testing can be used to enhance student performance, understanding, and retention. Some students feel pressured, and overall acceptance by one class was low. Altered implementation or group coaching may be needed to help students fully realize its objectives and potential.

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**VIDEO INTRODUCTION TO A PROBLEM-BASED LEARNING CASE IMPROVED GROUP LEARNING**

Carol Whitfield, Paul Haidet, James Ballard and Kent Vrana, Penn State College of Medicine, Hershey, PA 17033

**PURPOSE**

Problem-based learning (PBL) cases presented on paper tend to become rote exercises to students. The aim of this project was to replace the initial pages of a case with a taped interaction between a physician and medical student and with a standardized patient.

**METHODS**

A video of the physician and medical student performing the history and a focused physical exam and conducting a wrap-up conference was made to replace the equivalent pages of a paper case. The wrap-up conference showed the student considering differential diagnoses. Penn State's second-year medical class of 20 PBL groups was randomly divided in half, with one half using the case with video as the first four pages, and the other half using the identical paper case. Our evaluation included a pre- and post-knowledge-based test, an open-ended post-survey of attitudes completed by students and facilitators, and a 90-minute focus group with randomly chosen students from the video-group.

**RESULTS**

A 10 question pre-test showed no difference between paper and video groups. Post-test results were significantly higher for the video group ( $p=0.021$ , student's  $t$  test). Qualitative analysis of the survey responses and focus group showed that students in the video supported groups experienced higher group member engagement, greater sense of confidence in their differential, perceived enhancement of memory and better perceived understanding of physician-student interaction in clinical settings. Facilitators in the video group perceived the group discussion to flow better and the students to be more engaged.

**CONCLUSIONS**

Using a video to replace paper PBL cases enhanced group dynamics, student engagement and recall.

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**MENTORING MEDICAL STUDENTS IN RADIATION ONCOLOGY AND OTHER CANCER-RELATED DISCIPLINES BY INTEGRATED TEAM-BASED LEARNING CASES**

Nicholas J DeNunzio, BS, Ariel E Hirsch, MD

**PURPOSE**

Now, more than ever, medical students require comprehensive training in caring for patients with cancer. In fact, in the United States nearly 1 in 2 men and just over 1 in 3 women will be diagnosed with, and potentially die from, cancer in their lifetime. Furthermore, treatments are rarely unidimensional as evidenced by 60% of all cancer patients receiving radiation as part of their prescribed regimens. Here we propose a novel team-based learning (TBL) experience for second- and third-year medical students to expose them to, and nurture some students' interests in, radiation oncology in the context of our integrated oncology education initiative (OEI) at the Boston University School of Medicine.

**METHODS**

Given the multidisciplinary nature of cancer patient care, it is only proper that the proposed TBL exercise be administered in an integrated manner, preferably at the conclusion of the second and third years of medical school. At the end of the second year students have fundamental knowledge of the basic science of disease while at the end of the third year they have obtained a working understanding of some of the major areas of clinical practice. The basic format of these sessions would be to present a small number of cases (1-2) over a two-hour period that may be discussed by faculty leaders from multiple oncology-related fields including those, like radiation oncology, that are traditionally underrepresented in the undergraduate medical curriculum. Furthermore, independent work may be pursued by the students in the days immediately following the session so as to further develop their understanding of one or several of the fields discussed during the larger session.

**RESULTS**

It is our hope that this educational program will stimulate interest in a variety of fields related to cancer care, notably radiation oncology. We see this format as having great potential to expose students to a variety of related but specialized medical fields as well as provide them a conduit to these areas of study via leaders in these fields as they promote dialog about the cases. Simultaneously, these sessions will address a practical issue facing today's community of healthcare workers: seamlessly providing outstanding integrated cancer care.

**CONCLUSIONS**

Integrated TBL exercises may be employed both by any component of the medical community that may have many areas of specialization that rely on one another for optimal outcomes. Ideally this paradigm will achieve the intended educational benefits as well as promote cohesion among colleagues as they discuss and research cases together.

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**SCORING CLINICAL SKILLS EXAMS WITH THE APPLE IPAD**

Rick Ash\*, Sara M. Lamb, Adam T. Stevenson, Paul E. Burrows, University of Utah School of Medicine and University IT, Salt Lake City, Utah 84132 U.S.A.

**PURPOSE**

Replacing paper checklists with electronic forms to score clinical skills exams would simplify both grading and record keeping, be more environmentally friendly, and facilitate tracking students' performance.

**METHOD**

The Apple iPad tablet computer can be held like a clipboard to display a form created with FileMaker Pro database software and the FileMaker Go utility. The form can contain touch sensitive checkboxes and text entry fields. A 42-item pilot checklist was created to evaluate performance on a required third-year medical student pediatric clinical exam.

**RESULTS**

Eleven clinical evaluators have used the iPad to evaluate 38 students in 3 pediatric clerkship rotations starting in the fall of 2010. The iPad and FileMaker form were generally found to be as easy to use as the previous paper and pencil version. Size and sensitivity of touch boxes were important features. Clinicians appreciated that data identifying each examinee were pre-entered and that the computer immediately calculated the score. Staff benefited from the ease of uploading data.

**CONCLUSIONS/FUTURE DIRECTIONS**

The iPad/FileMaker combination can replace a paper checklist. The ability to pinch, expand, and move the form allows it to match the ease of ticking off boxes on paper. Automatic scoring and direct uploading of results to a grade book program are advantages over paper forms. We plan on extending this project to exams in other units. This will often require displaying and navigating through a larger number of items and allowing the entry of short comments, which will be selected from a limited, pre-entered set identified by faculty from prior exams. With broader utilization of the iPad we will be able to store data from all of our clinical exams and track students' progress over four years.

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## **STUDENT USAGE OF STREAMING VIDEO/DVD ELECTRONIC MEDIA IN A BASIC SCIENCE CURRICULUM**

Jinping Li MD PhD, Shi-Wen Jiang MD MSc, Edward C. Klatt MD Department of Biomedical Sciences, Mercer University School of Medicine, 4700 Waters Avenue, Savannah, Georgia, 31404, USA

### **PURPOSE**

Basic sciences at our medical school are taught in 2 preclinical years at two campuses with a PBL curriculum supplemented by optional attendance at up to 10 hours per week of lecture-style resource sessions from 1 to 3 hours in length. Sessions are either faculty generated based upon difficulty of learning materials or derived from questions raised by students. Live sessions originating at one campus are teleconferenced to the other campus. All live sessions are recorded with both DVD media placed in the library and streaming videos uploaded to the school website. This study asks: how do students apply these electronic recordings to their learning process?

### **METHODS**

A voluntary anonymous questionnaire concerning the use of streaming video and DVD media was e-mailed to 90 preclinical students. Of 15 survey items regarding amount of usage and circumstances for usage of these recordings, 11 included open-ended questions soliciting comments.

### **RESULTS**

Of 44 respondents, all had downloaded a streaming video or used a DVD. 82% watched resource sessions on the web from 2 to 4 times per week. A majority of respondents listed availability, accessibility, convenience, discipline subject, and length of the resource session as factors they considered when choosing either the web version or DVD version. 86% of respondents preferred watching streaming video on their own schedule to maximize study efficiency. 75% agreed that electronic recordings of resources could be as effective as live sessions. Overall, 72% of the respondents wanted resource sessions to be given before PBL sessions, and 93% did not believe that there were too many resource sessions.

### **CONCLUSIONS**

Electronic recordings of lectures represent a valuable learning resource. Most students use electronic versions of live sessions, in either web streaming video and/or DVD, and find them as equally effective as live sessions. These survey results may help us improve delivery of both live and recorded resource sessions to effectively facilitate active student learning for basic sciences.

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**ABCD WEBSITE: ENHANCING EDUCATION OF BIOCHEMISTRY IN SCHOOLS OF MEDICINE, PHARMACY AND DENTISTRY.**

David S. Franklin, PhD Tulane University Health Sciences Center, School of Medicine, Biochemistry Department, 1430 Tulane Avenue, New Orleans, LA 70112

**PURPOSE**

The Association of Biochemistry Course Directors (ABCD) was officially created in April 2008 at the conclusion of the 1st Medical Biochemistry Education Strategies Workshop. The mission of the ABCD is to bring together course directors from all medical, dentistry or pharmacy schools across North America and the Caribbean. Through common interests to improve education of biochemistry topics, the ABCD wishes to (A) develop objectives to improve biochemistry curricula, (B) utilize effective interactive teaching methods and learning principles to biochemistry, (C) provide continuing education in recent and/or controversial areas of biochemistry, and (D) provide expanding educational resources to ABCD members.

**METHODS**

The ABCD website ([www.abcd.wildapricot.org](http://www.abcd.wildapricot.org)) was unveiled in March 2010. Instructors of biochemistry can apply on-line for membership to the ABCD, expanding its member base. The site provides contact information of ABCD members, allows a channel to disseminate information and contains a secure location for educational resources. All resources are available to ABCD members.

**RESULTS**

As of April 2009, the ABCD consisted of 106 members. Since its creation, the ABCD website has accepted 49 new on-line members, increasing the ABCD by 46% to 155 members. 76 of the 106 original members (71.7%) are registered through the website, bringing total on-line membership to 125 individuals. 145 members represent 100 different schools from 37 US states. 7 members represent 2 Caribbean schools, and 3 members represent 2 Canadian schools. The breakdown of members by school type includes 127 from traditional medical schools, 18 from osteopathic medical schools, 8 from schools of pharmacy and 2 from dental schools. Presently posted resources include Essential Topics in Biochemistry, and 137 pages of test questions (broken down according to these Essential Topics). Future resources may include content from ABCD conferences (past and present), enhanced educational content (lectures, study guides, clinical vignettes, active learning modules, novel approaches to teaching) and samples of course syllabi and school curricula.

**CONCLUSIONS**

There was valuable interaction between ABCD members at each of the conferences. However, there is a need for continued dialogue and exchange of ideas and resources. The ABCD website will play a critical role in helping to enhance these interactions for the benefit of our students, our courses and our institutions of higher education.

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**SCAVENGER HUNT BASED MICROANATOMY LABORATORY REVIEWS USING VIRTUAL MICROSCOPY**

H.M. Goldman, J.D. Smith, J.R. Churchill and D.M. DePace Drexel University College of Medicine Philadelphia, PA 19129 USA

**PURPOSE**

Virtual microscopy has been increasingly used to supplement or replace microscope-based laboratories in medical microanatomy. At Drexel University College of Medicine, our goal was to incorporate virtual slides into our problem based learning curriculum while maintaining an interactive, group-learning experience. We opted to replace traditional laboratory sessions with web-based self-studies that are supplemented afterwards by small group 'scavenger hunt' review sessions. Students earn points toward their final grade for each structure their group correctly identifies, and collected images are used for a facilitator-led, interactive review.

**METHODS**

Our new format was first introduced in 2008. Each year we have assessed the effectiveness of the format by soliciting end-of-course feedback, and comparing mean practical exam scores between years. Changes to the format were made each year based on student feedback, and we implemented our current format in the Fall of 2010.

**RESULTS**

Students have responded enthusiastically to the modified laboratory format. Attendance at laboratory reviews nears 100%. Most students (89%) reported completing self-studies prior to attending the lab review, and 80% felt that doing so was beneficial to their understanding of the material. Practical exam performance has risen each year, reaching its highest level this last academic year, once we moved to a completely virtual slide based review format, with extended (1.5hr) review sessions.

**CONCLUSIONS**

The use of virtual microscopy based self-studies, when combined with interactive follow up sessions that require students to review and present relevant structures, has resulted in better student participation, a more positive perception of microanatomy, and improved student performance.

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**AN INNOVATIVE APPROACH TO TEACH MEDICAL HISTOLOGY: THE DEVELOPMENT OF ELECTRONIC LABORATORY MANUAL**

Mohammed K. Khalil and Debbie L. Kirkley College of Medicine, University of Central Florida, Orlando, Florida

**PURPOSE**

This study described and evaluated an electronic interactive laboratory manual developed to facilitate individual and group learning of medical histology.

**METHODS**

The laboratory manual includes links to virtual slides with navigation instructions, exercises to monitor student learning, and cases to provide clinical relevance. Students worked in groups to select the intended fields within the virtual slides, capture and label the images, upload labeled images, and solve exercises and clinical cases. Finally students generate a laboratory report to be sent to faculty for review and feedback. A questionnaire containing both closed-ended and open-ended items was administered to evaluate the instructional value of the laboratory manual. Five-point Likert-scale closed-ended items assessed the format and navigation, instructional contents, group process, and learning process. Open-ended items assessed student's perception on how the lab manual facilitates their learning. Students' responses to the closed-ended items were summarized as mean score and standard deviation. The open-ended items were analyzed to identify shared patterns or themes.

**RESULTS**

Students positively evaluated their experience using the laboratory manual with the mean score of 4.70 (SD=0.59) for the format and navigation, 4.45 (SD=0.82) for use of instructional contents, 4.15 (SD=1.03) for group process, and 3.91 (SD=1.06) for the learning process. They have indicated that the laboratory manual facilitates their learning by reinforcing and clarifying classroom sessions, and by supporting individualized and group interactive learning.

**CONCLUSIONS**

The laboratory manual was highly accepted by students, and was perceived to facilitate individualized and group learning of medical histology.

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**ADVANCED ANATOMY DISSECTION LAB ENVIRONMENT USING DIGITAL DISSECTOR AND REAL-TIME VIDEO DISPLAY**

Makhdoom A. Khan, Des Moines University, Des Moines, Iowa, 50312 Donald G. Matz, Des Moines University, Des Moines, Iowa, 50312

**PURPOSE**

Recent trends in medical anatomical education are mandating allotment of less time for anatomical education while at the same time requiring presentation of more clinically relevant information. To this end we developed a paperless gross anatomy dissection lab environment that encompasses the latest technology and fosters an environment where students can access relevant material efficiently.

**METHODS**

We developed a dissection lab that houses 43 cadaver tables and accommodates 215 students. Each table is equipped with a 32" LCD flat panel screen monitor and a computer connected to the University's Broadband network. The computers can also receive high-resolution streaming videos generated from an adjacent prep room. During dissection exercises, students utilize a digital dissector running as a multimedia application on their table monitor. The dissector contains instructions and hyper-linked anatomic images via Microsoft Toolbook 9 software application.

**RESULTS**

Each lab is preceded by a live pre-lab dissection video that the student can view on their own table-side monitor. The videos are generated in an adjoining room with the use of a sky eye camera. Each dissection table consists of one student "Navigator" to guide the other 4 student dissectors by tracking and coordinating their work on a wall mounted monitor. The students are able to use the server-based digital dissector with preprogramed hyper-linked images to appear on a split-screen monitor.

**CONCLUSION**

This paperless lab design allows the students to have table-side access to a vast range of didactic and visual information in a relatively short period of time that today's curriculum demands.

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**AN INTERACTIVE VIRTUALIZATION TOOL FOR STUDENT-CENTERED LEARNING OF CN II & III PUPIL EXAM**

Kenneth Bogert, University of Georgia Eve Gallman, Georgia Health Sciences University J Ned Pruitt II, Georgia Health Sciences University D Scott Lind, Georgia Health Sciences University Aaron Kotranza, University of Florida Benjamin Lok, University of Florida Juan Cendan, University of Central Florida Kyle Johnsen, University of Georgia

**PURPOSE**

The difference between a normal and an abnormal finding in a neurologic exam may lie in a dynamic response that is lost in a static image. Computer-based simulations can provide the learner with demonstrations that include both normal and abnormal findings, allowing self-guided discovery. The purpose of the present work is two-fold: first, to develop an interactive computer simulation of pupillary responses; second, to determine whether such simulations improve medical neuroscience education.

**METHODS**

As an extension to the NERVE project (See Peden et al 2011, MedEd Portal #8255), a computer simulation is in development that will allow students to explore normal and abnormal pupillary responses to light, accommodation, and pharmacologic testing (eyedrops) and formulate hypotheses regarding lesion location. The disorders are encoded as changes to a biomechanical model of the neuromuscular system that controls pupil size. The biomechanical model is used to drive the behavior of a 3D virtual patient that is presented to the student for practice, for exploration, or as an assessment.

**RESULTS**

The current implementation is capable of simulating a wide variety of pathologies that present as pupil abnormalities. Students or instructors can adjust the model by selecting from a number of different disorders (e.g. Horner syndrome) or specific lesion sites. Students can then interact with the virtual patient using various tools (e.g. a pen light) and drugs (e.g. cocaine), or have the patient perform activities (e.g. follow the light).

**CONCLUSIONS**

The simulation is currently undergoing content validation. Following this, a randomized controlled experiment will assess the extent to which the simulation adds to student understanding and retention of the material.

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