

THE SCIENCE OF LEARNING SYMPOSIUM



March 21-22,
2018

How the cognitive integration of basic
and clinical sciences supports expertise

Invited Workshop Facilitators, Drs. Nicole Woods and Maria Mylopoulus

Sponsored by the AVMA Veterinary Educator Professional Development Grant & the WSU CVM Teaching Academy.



The Science of Learning Symposium

HOW THE COGNITIVE INTEGRATION OF BASIC AND CLINICAL SCIENCES SUPPORTS EXPERTISE

DR. NICOLE WOODS

*Scientist & Associate Director, The Wilson Centre
Associate Professor, Department of Family and
Community Medicine University of Toronto*

DR. MARIA MYLOPOULUS

*Scientist & Associate Director, The Wilson Centre
Associate Professor, Department of Paediatrics
University of Toronto*



Schedule of Events

Global Objectives for the Symposium:

Participants will be able to:

- Develop strategies to achieve cognitive integration in their basic science and clinical teaching
- Understand adaptive expertise as the ultimate goal of an 'integrated curriculum'
- Develop strategies to prepare students for future learning

Wednesday, March 21

12:10 pm - Keynote Lecture: How we know what isn't so: Reconsidering the value of basic science
Objectives:

- To consider the value of basic science for clinical reasoning from the perspective of basic and clinical science teachers
- To explain recent research findings from health professions education and cognitive psychology
- Introduce the concept of cognitive integration in education

3:00 - 5:00 pm - Workshop: Preparing learners to be the experts we need
Objectives:

- To understand adaptive expertise as the goal of curricula
- To describe the ways in which cognitive integration supports development of adaptive expertise
- To work together to design 'productive' learning experiences for students

Thursday, March 22

9:00 - 11:00 am - Workshop: Teaching strategies for cognitive integration

Objectives:

- Define educational approaches that support integration of basic and clinical sciences
- Consider what forms of knowledge constitute basic science
- Provide practical approaches for teachers to support cognitive integration

12:10 pm - Workshop: Assessment matters: Aligning assessment with curricular goals

Objectives:

- Describe 'assessment for learning' as a key principle of curricular design
- Consider how to assess for 'preparation' and 'integration'
- Provide practical approaches for teachers to develop assessment tools

ATTENDANCE SUMMARY

The Science of Learning Workshop reached a wide variety of audiences, totaling **84** faculty, graduate, and staff members over **6** different colleges, from **4** campuses (Pullman, Spokane, Logan & Bozeman). For more details, see attendance summary (Appendix A)

		Total Attendance	Pullman	Spokane (COM)	Spokane (Pharmacy)	CVM (Bozeman)	YouTube Live Views (unknown sources)
Wednesday, March 21st	12 pm: Keynote: How we know what isn't so: Reconsidering the value of basic science	58	46	4	4	1	3
	9 am: Workshop: Preparing learners to be the experts we need	40	29	6	2		3
Thursday, March 22nd	3 pm: Workshop: Teaching strategies for cognitive integration	37	22	9	3	1	2
	12 pm: Workshop: Assessment matters: Aligning assessment with curricular goals	50	36	8	3		3

**Note: Livestream video, were only able to track views, not able to determine how many people were watching on the other end

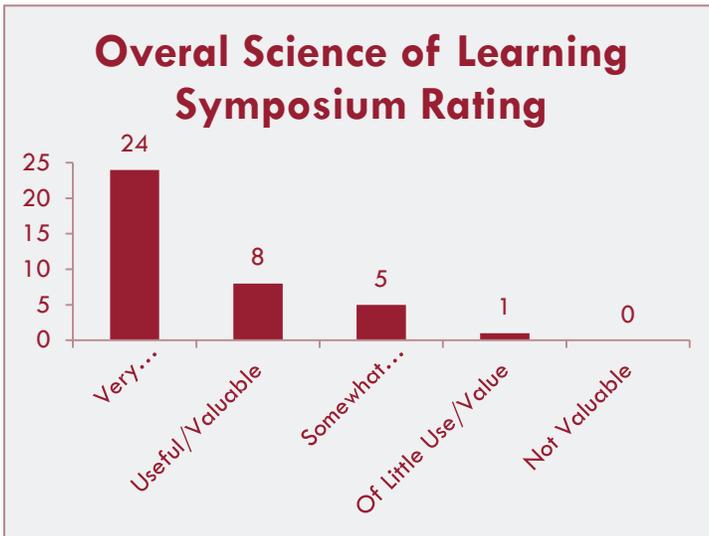
SURVEY RESULTS:

Survey response rate was 45.2% (N=38)

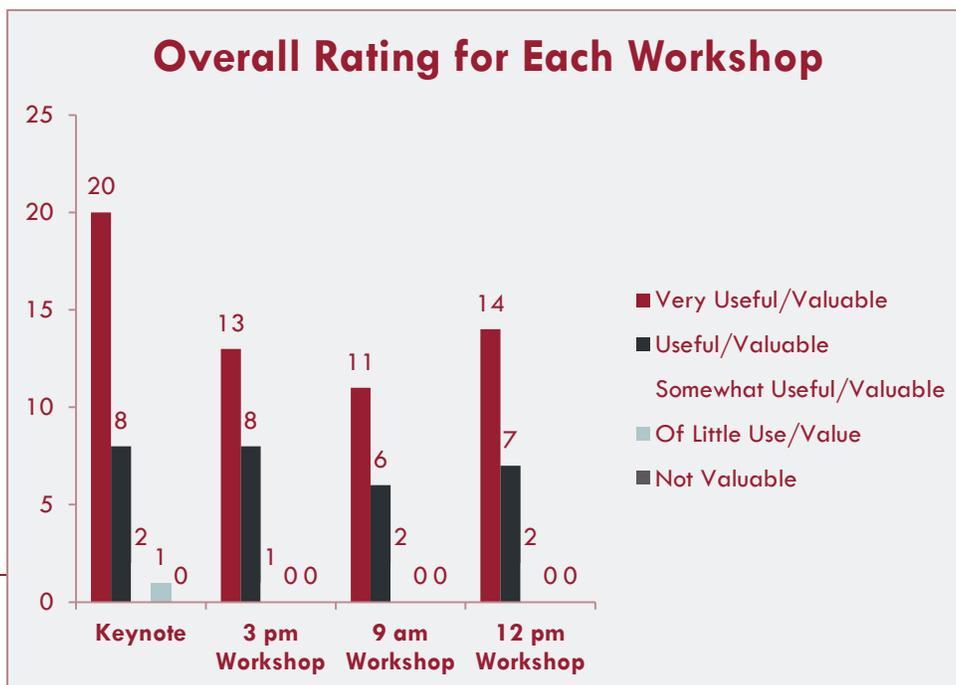
Faculty - mid to late career	19	50.0%
Faculty - early career	12	31.6%
Graduate Student	4	10.5%
Staff	3	7.9%
TOTAL	38	

Colleges	
College of Veterinary Medicine	26
College of Medicine	6
College of Pharmacy	3
College of Education	1
College of Nursing	1
AOI	1

	Keynote	3 pm Workshop	9 am Workshop	12 pm - Workshop
Survey Responses for Specific Workshops	33	22	21	25



Overall, 84.2% of the survey participants found the Science of Learning Symposium to be useful/valuable to very useful/valuable experience.



Overall Comments:

- I appreciated having subject matter experts who were excellent at communicating their research findings as well as synthesizing those of their fellow scientists.
- Top class speakers! they really nailed it, providing needed spark for our curriculum changes
- Very useful workshop, and I was surprised about the data they presented.
- Overall, I have enjoyed this symposium and several other teaching academy workshops I have attended. Keep up the good work! I would like to have access to the talks and a list of references. Will those be available for each talk in this program?
- I tend to enjoy cognition related to teaching and learning. It seem the best available science to inform out teaching methods.
- Great symposium! Speakers were dynamic and very knowledgeable on the subject matter. They adopted an evidence based approach and used small group sessions as well which I found very effective.
- Well done! Great, interactive speakers, fascinating topics. Applicable to all (instructors, coordinators, administration).
- I only went to one session. It was fine, but I usually prefer to attend talks in person.
- They are two special educators/scientists. It was awesome to have them stop by!
- "This was excellent! This was very helpful and well worth the time. This also had several good take away points, and all the information was well supported.
- I think some additional help in how to incorporate some of these ideas into test questions or perhaps some additional examples of how an instructor might further integrate would be good. This helps to make sure as an audience we interpret it correctly."
- "I liked the format with time in the morning and mid-day breaks that were long enough to get a few other work day tasks done.
- I attended via videoconferencing and it worked great. Thank you!"
- "The symposium was outstanding, as were these excellent symposium leaders. It is one of the best events the CVM Teaching Academy has sponsored in several years. Now I'm just hungry for more!
- Kudos also to Rachel Halsey for her excellent organizational work."
- Nicole Woods was very inspiring. As is hard to do, finding a way to cover clinics for individuals who want to attend would improve the experience for the clinical faculty.
- "I wish I could have attended more of the programming and will hope to do so where I can in the future."
- thank you for bringing these folks to WSU
- I'm never sure that it makes sense to pay outside speakers to tell us things that we already know. Administrators need to listen to faculty members, who are "in the trenches" and can observe the outcomes of their own teaching.
- Thank you!!!
- "I was only able to attend one session, but it was excellent. Good time for interaction among attendees."
- Tremendous content, and I really appreciate the VetMed's collaboration on this amazing event. Our faculty gained a lot from it!
- It rocked.

Keynote Lecture:

HOW WE KNOW WHAT ISN'T SO: RECONSIDERING THE VALUE OF BASIC SCIENCE

Objectives:

- To consider the value of basic science for clinical reasoning from the perspective of basic and clinical science teachers
- To explain recent research findings from health professions education and cognitive psychology
- Introduce the concept of cognitive integration in education



90.3% of the survey participants felt the keynote lecture was valuable/useful to very valuable/useful for meeting the set objectives.

Most Valuable Aspect:

- Pointing out the value in teaching basic science, but also noting that it's not much--just enough to enhance understanding and stimulate retention.
- Synthesis of research findings
- Data driven conclusions.
- Great connections to previous work. Building a semantic student network through curriculum
- The study-based evidence
- Great information on something about there are a lot of assumptions. Great to have data.
- Good overview of the need for integrating basic science into a clinical curriculum. (I'm not a clinician but teach in the basic sciences), thus this was equally applicable to my courses.
- Research that has direct application to teaching and retention of knowledge
- The speaker was excellent (articulate, explained things very well, good speaking voice), great PowerPoint and visuals to explain the studies.
- Practical (yet eye-opening) information.
- Data demonstrating that the contribution of basic science education can be demonstrated in more subtle outcomes than are typically tested.
- Data related to integration of basic sciences
- The volume of basic science matters.
- It gave me a different perspective and discussed research I had not seen previously.
- Really opened my eyes to how to balance medical knowledge and basic science.
- This helped to reinforce that this was not just an issue of basic science in the curriculum as a whole but to be able to help give students connections with basic science for individual classes/topics
- Assurance that we are on the right track!
- how basic science is an integral part of medical education

- Incredibly effective presentation of some key concepts and very useful terminology. I appreciated very much that all the presentations were evidence-based.
- clear, concise and well-delivered seminar; very relevant to our program
- The keynote was excellent as a stand-alone seminar, but also set the tone for the rest of the symposium.
- I really enjoyed learning about people's biases on their training background for what is needed and expected for the success of future students. Also, neat to see the ways she thought about addressing and testing the biases towards better training outcomes. A powerful piece of work on difficult material to assess robustly. People are messy to study!
- This lecture was personally very interesting and I enjoyed it quite a bit. It also laid the groundwork very well for later lectures.
- The session was well organized and a perfect primer for what was coming next in the workshop.
- Very informative. Introduced abstract concepts that are not typically considered, innately.

What might be improved:

- Explaining where you draw the line between basic science and clinical science--or your exact definition of basic science. Without basic science at all, then clinical science wouldn't even be a science--it would just be anecdotal... "When we see this type of lesion, we don't know what it is or means, but we give it this treatment and it seems to work--we don't know why."
- As this was the first of several sessions, clear connectors (!!) to other sessions would have helped
- Consider increasing the pace of delivering the information and examples.
- A bit less psycho-speak would have been helpful.
- Not use as much medical education terminology and more specific examples related to clinical medicine and how we can use this information to improve our teaching practices
- I would have liked to see even more data.
- Some discussion/critique of the study methodology and any strengths/weaknesses it might have would be useful.
- It would probably be useful if the moderator and/or speakers reminded the audience periodically that there were also people live streaming each session and that the microphones were for their benefit. This was hard to appreciate because we couldn't see the virtual audience and the microphones didn't amplify in the room. So everyone tended to forget.
- Sometimes I had trouble hearing--but overall I thought the slides were very good and the presenter was very good.
- More examples to illustrate that abstract concepts that were discussed.



Workshop

PREPARING LEARNERS TO BE EXPERTS WE NEED

Objectives:

- To understand adaptive expertise as the goal of curricula
- To describe the ways in which cognitive integration supports development of adaptive expertise
- To work together to design 'productive' learning experiences for students



95.5% of the survey participants felt the workshop was valuable/useful to very valuable/useful for meeting the set objectives.

Most Valuable Aspect:

- Concepts of knowledge types and their relationship to expertise
- Good discussion, positive message. Also data driven.
- Data presented to support theory
- getting the evidence behind the practices
- The opportunity to apply the information to the discussions in small groups. Also, keeping the focus on the course level (for the small group discussion).
- Tools for preparing student to be adaptable.
- Very informative and evidence based
- Teaching methods and active learning tools
- The idea of productive failure and the need for practice was very helpful
- The concept of adaptive expertise was new to me. The explanation helped to scaffold the previous session with the following workshops.
- how integration of knowledge can be used to guide learning
- This was perhaps my favorite of the 4 sessions. The delineation of the goals of our programs (producing an expert?) and the discussion of expertise were very enlightening. As with all the sessions, the speakers were incredibly organized, succinct, and eloquent. Beautifully done.
- good balance of information delivery and interactive components; very useful framework of productive/unproductive success/failure
- The speakers precisely explained how to integrate concepts of adaptive expertise and productive learning experiences into our teaching strategies.

What might be improved:

- Slides tended to go by a bit too quickly for making notes.
- A room with tables.
- I would have liked to have seen more examples
- If you have not, consider publishing a sort of 'worksheet' that can be used by teams of faculty to begin the discussion and possibly guide the review and update.
- Some more detailed methods for actually integrating ("designing") this information into our courses would have helped.
- Too much medical education jargon/terminology. Need more veterinary related examples
- I think more concrete examples of time spent on many of these new vocabulary words/concepts would have been helpful. I think I have a solid understanding now of the terms productive failure, productive success, and adaptive expertise but I'm not 100% sure since these are very new ideas to me and the first time I have heard them.
- This was very good--perhaps some additional specific examples to help with appropriate test questions since these are always a challenge to write and apply principles
- There was a lot of acronyms and lingo used in the didactic portions of this session. As a new teacher, I spent much time sorting out the terms.

Workshop

TEACHING STRAGIES FOR COGNITIVE INTEGRATION

Objectives:

- Define educational approaches that support integration of basic and clinical sciences
- Consider what forms of knowledge constitute basic science
- Provide practical approaches for teachers to support cognitive integration

89.4% of the survey participants felt the workshop was valuable/useful to very valuable/useful for meeting the set objectives.

Most Valuable Aspect:

- Great use of experiments to aid progress
- Lots of data presented support the benefit of cognitive integration.
- Good feedback and practical approaches to support cognitive integration



- Explained the science behind many of the struggles we have with teaching health sciences and ways to overcome them.
- The idea that instructors need to provide the integration--not just having students teach themselves
- Suggestions for approaches to classroom activities to help integrate learning.
- How to tie together basic and clinical knowledge in a way that integrates everything
- The data that the speakers shared was particularly powerful in supporting their assertions on ways that integration might be used effectively. Wonderfully presented, including the way the speakers traded off speaking turns and answered questions.
- Clear discussion of the challenges identifying how expert clinicians use basic science; really useful construct of semantic networks
- This was one of the best sessions that help me understand the SCIENTIFIC basis behind integrating basic sciences with clinical sciences. The speakers used solid data to summarize applied aspects of integration.
- Useful to see teaching from an angle that is not typically considered.

What might be improved:

- Sometimes it is easy to propose new ideas, while facilitating change is tough. Concrete examples or models might have aided this session
- Little in the way of practical tools to use. Really wanted more tools.
- Not enough time to complete the group exercises. Would like more recommendations for how to incorporate cognitive integration
- hard to hear
- In the future, even with a small room, I would encourage the speakers and event organizers to ensure that every speaker had a microphone that amplified in the room. It would be good to have more than 1 handheld microphone for the audience to pass around. It was often very awkward to share just the one.
- I had a difficult time fully understanding the concepts that were described. More examples of how the concepts could be implemented would have helped.



Workshop

ASSESSMENT MATTERS: ALIGNING WITH CURRICULAR GOALS

Objectives:

- Describe 'assessment for learning' as a key principle of curricular design
- Consider how to assess for 'preparation' and 'integration'
- Provide practical approaches for teachers to develop assessment tools



91.3% of the survey participants felt the workshop was valuable/useful to very valuable/useful for meeting the set objectives.

Most Valuable Aspect:

- That testing of conceptual knowledge can be accomplished with well-designed MCQ's.
- Excellent wrap up.
- seeing the spectrum of possible assessments
- Nice description of how assessment can be used as a learning tool.
- Defining assessment of learning vs assessment for learning - strategies for both
- Practical suggestions for a different way to look at assessment.
- It was so great to hear their experiences and know that some of the things we are struggling with, they are as well. They had great ideas and insights on how we can do things better. I am so glad they came and we were able to hear from them. I hope they come back again in the future. College of Medicine could really benefit from working with them.
- Discussion on the types of integration utilized by many programs (programmatic, course, session-level)
- Discussion.
- The idea that testing on a subject cannot be a one-time event but must build into integrated learning
- I know that measuring recall isn't the goal of assessment, but it's difficult to create assessments that serve to augment learning. For me, this session was the most helpful. It was a great reminder to really work at creating relevant assessments that measure concept integration and not just recall.
- different tools for assessing knowledge and learning
- It was most valuable to look at our practices and better understand what we are really assessing - notably the emphasis on recall and the examples of ineffective "integration" questions.
- nice presentation of test-enhanced learning and how formative assessments can be most effective
- This did a great job of pulling the whole symposium together, but building on new concepts.

- Provided good examples to help understand assessment of integration.

What might be improved:

- Again, more specific examples -- maybe "baby steps" for our curriculum
- Having more of our folks there.
- I think it would have been really great to follow this workshop with a CVM discussion/debrief about more concrete ways we can make small changes in the CVM curriculum based on these two days of workshops.
- None-this answered a lot of questions for me.
- Although we saw 2 examples of ineffective integration questions, it would have been very useful to see a few of what the presenters would consider "good" questions. There was also apparently a miscommunications regarding whether this was to be a 60 or 90 minute session. That was a shame as too many people had to leave and the speakers surely felt rushed.
- it was unfortunate that there was apparently some miscommunication about the length of this session, which led to a number of people having to leave early due to prior commitments.
- It was difficult at times to follow the didactic parts, because terms/concepts were used from previous sessions that I could not attend.

AS A RESULT OF THE SCIENCE OF LEARNING SYMPOSIUM, WILL YOU CHANGE OR EXPERIMENT WITH THE WAY YOU TEACH?

Yes, I have already started	6
Yes certainly/without question	17
Yes, likely	7
Perhaps	5
No, not very likely	1

When asked what they are planning or likely changes in their teaching that have been taken from this symposium:

- I will not be adding more detailed basic science as I have often wondered whether I should. I keep it simple to make what I want the students to learn understandable and retainable long-term, and I got the impression that is a good practice.
- Including more 'why' relative to 'what'
- "I have to work to be more explicit about the connections I help students create Rather than tell, I will encourage them to build"
- I like the idea of getting the struggle in the learning back....
- I will change the structure of my lecture sessions, and start by introducing the case first.
- More sharing information and integrated into advising.

- I already do many of the integrative elements but don't feel comfortable "experimenting" on students without a solid set of tools at my disposal. I don't feel that I got those tools in this symposium.
- I have already changed the way I interact with students in VM 555- I use the same problem strategy as with 4th years, now with 3rd years. Supported by data presented.
- Incorporate even more basic science and relate it to clinical medicine
 - Better integration of material (eg. resident book review/JC)
 - Better assessment and test questions"
- Presenting different perspectives on same concepts
- I have always believed in the value of teaching basic science, and am perplexed that we need to prove its value at this point in human history. I am not planning to change anything, because this is what I already do. The issue is whether the administration is willing to change the professional curricula so that we are allowed to teach basic science adequately.
- Continue to incorporate a little basic science in all teaching.
- Moving from contextual teaching to true integration remains a challenge for us. First step, imagining how to get people to understand and adopt...
- I am already changing the order with which I present information and make sure I use more simplified basic science to answer the question of why both on the clinic floor and in didactic teaching.
- I plan to utilize more quiz questions for formative practice, including some formative questions that get at the basic concepts to help ensure foundation of the science versus just the clinical practice. I also will re-evaluate some sessions to help with integration as this gave me ideas to help improve this.
- I am reviewing objectives, plan to redesign learning activities and assessment methods for the classes I teach next fall.
- integration of content and assessment tools
- I plan to work closer with my junior teaching colleagues in the courses I teach to apply these principles, notably the use of strategies that more effectively promote the COGNITIVE integration of the basic and clinical science concepts we teach. Clearly the connections need to be made explicitly. I also plan to intervene so that My junior colleagues stop using cases as examples (contextual) and instead begin by posing some active problem solving with those cases.
- working on increasing actual integration as opposed to just using clinical materials to provide context
- I am currently writing my exam questions for this semester's course, so plan to look at them in a new way.
- The information was not as relevant to what I teach.
- Reorient materials towards better integration of basic sciences with clinical outcomes/implications.

SUGGESTIONS FOR FUTURE TOPICS, ACTIVITIES, ETC.

- It's great the teaching academy provides information to help participants become better teachers but until the university/CVM actually values 'teachers' it is simply preaching to the choir how to 'make teaching matter.' The participants already care, by definition. We need to make TEACHERS matter to those who provide promotions, pay, and positions. Since that won't happen soon, maybe branch out in offerings to include quality of life stuff, stress and time management, the development of scholarly activities, more CV building and promotion assistance, etc. In other words, support teachers as they try to develop their career. Right now, teaching academy gives great ideas and inspiration for teaching but implementing these ideas is a lot of work, planning and coordination. Not more pay, not promotion, no acknowledgement of innovation and teaching, and certainly not an improvement in the work life of the participants. Until teaching faculty is valued, teaching academy as structured is a pleasant collegial activity but provides little benefit to the individual.
- Curriculum design best practices? Implementing design changes while assessing?
- What about following up this workshop with a debrief session or an implement workshop (i.e. how to implement this workshop into daily clinical teaching/didactic teaching).
- Effective test question writing
- Perhaps we could get Nikki and Maria's colleague, whose expertise in on assessment, back for another workshop!
- sessions to provide guidance, practice and feedback on writing assessment items
- Many of the seminars and workshops are aimed at people who have taught before and/or are currently teaching. The topics often center on how to improve your teaching and require a baseline experience from which to draw. Workshops aimed at early-stage career teaching for those that have not taught before and will be in the future, would be helpful.
- More, More! David Hirsh from Harvard on LICs, integration of clinical learning and outcomes. Glenn Regehr from UBC (we've already had Kevin Eva). Catherine Lucey (UCSF) on professionalism and more. Adina Kalet on remediation (NYU).