

*Bridging the Divide:*  
**Promoting Deep Learning by Integrating  
Research, Teaching and Learning**

University of Waterloo  
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# Three key questions

1. What are the defining features of research within undergraduate education?
2. How can undergraduate research foster deep learning?
3. How can we embed research in coursework in ways that promote students' active engagement and deep learning?



# CONTEXTUAL FACTORS



# U of Saskatchewan

- 1,131 tenured and tenure-stream profs
- 20,494 students (UG= 17,223; Grad=3,271)
- No university-wide Office of Undergraduate Research, but in development
- Recent investment of \$400,000 per year base funding to UGR



# U of Alberta

- 1,464 tenured and tenure-stream profs
- 38,290 students (UG= 30,944; Grad=7,346)
- University-wide Undergraduate Research Initiative (started in 2002 by VPR, now reporting to Provost)
- Permanent investment in \$400,000+ per year
- The Students' Union actively involved in supporting/promoting UGR



# McGill University

- 1,677 tenured and tenure-stream profs
- 35,478 students (UG= 25,573; Grad=9,905)
- No university-wide Office of Undergraduate Research
- Teaching-Research Nexus Project led by Teaching and Learning Services since 2008
  - Part of institutional mission
  - Resources provided



**WHAT ARE THE DEFINING  
FEATURES OF RESEARCH WITHIN  
UNDERGRADUATE EDUCATION?**



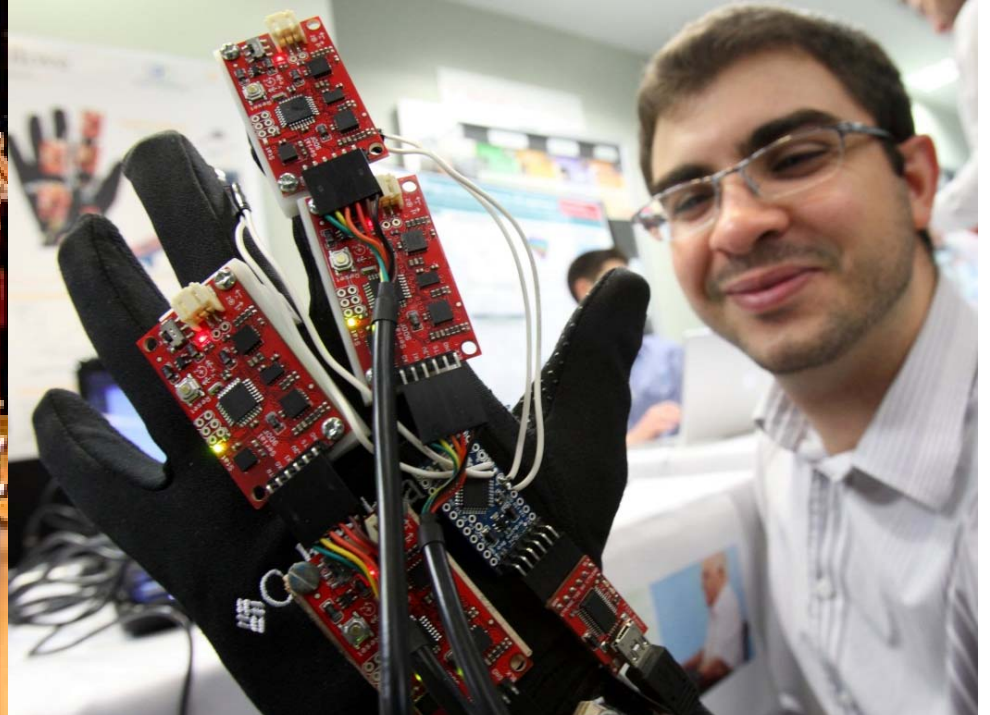
## What is undergraduate research?





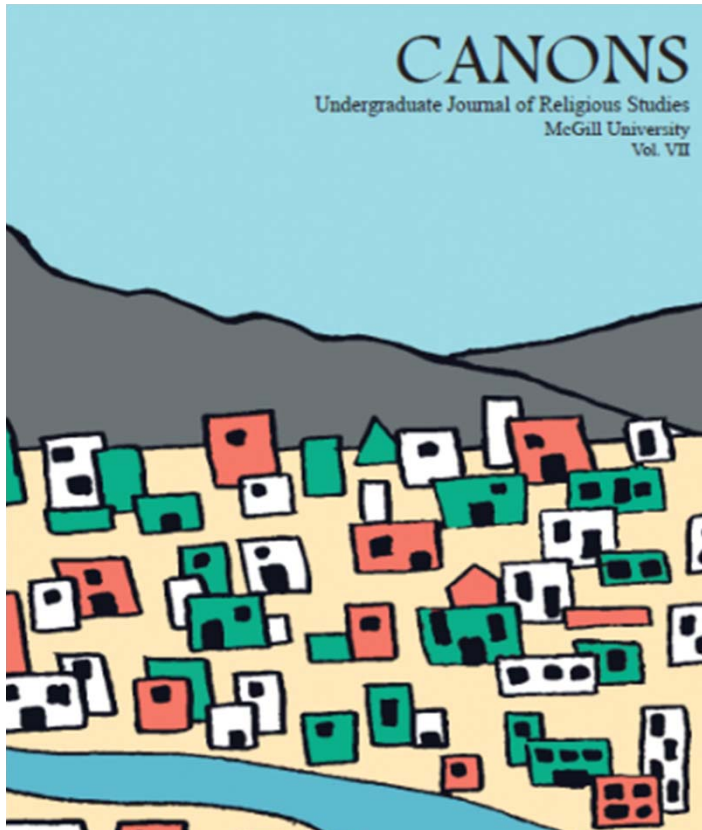


# Supervised research projects

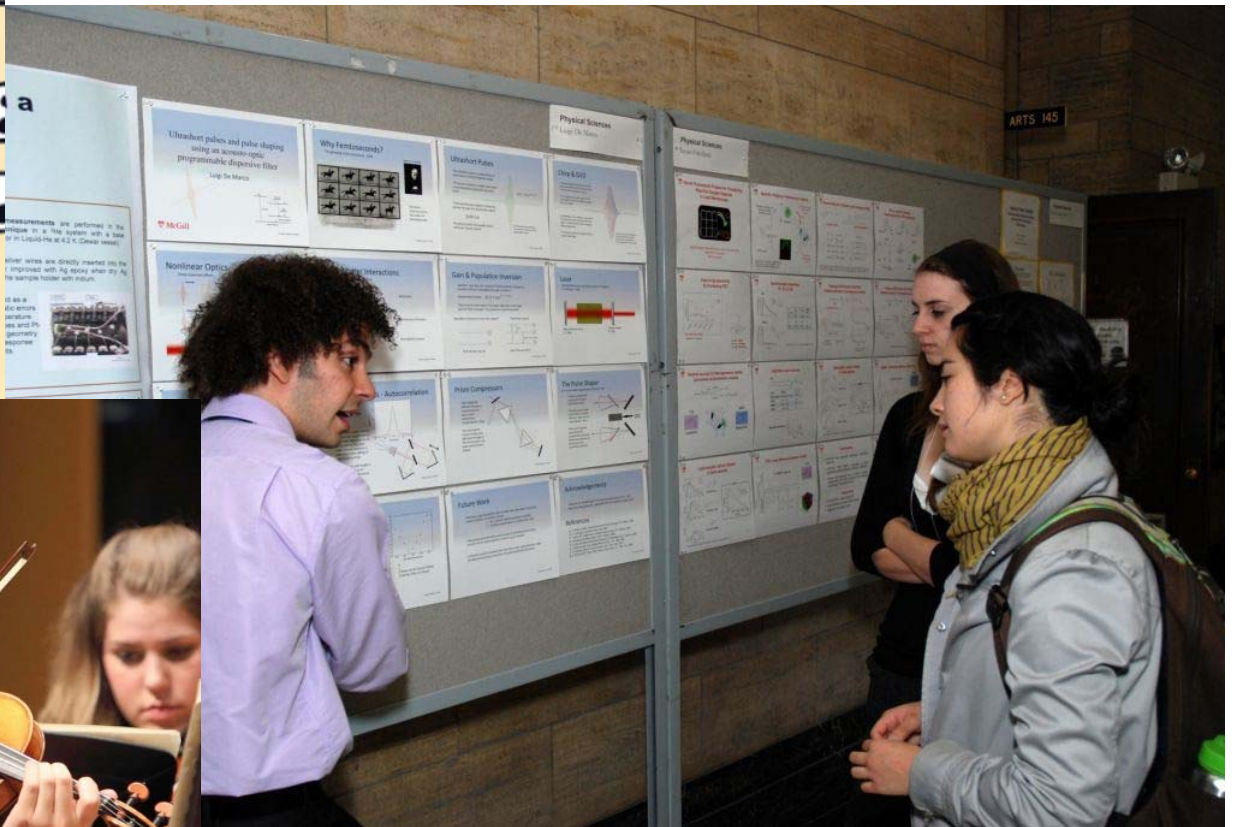


# Internships & placements





# Public events & publications





**Part of  
coursework**





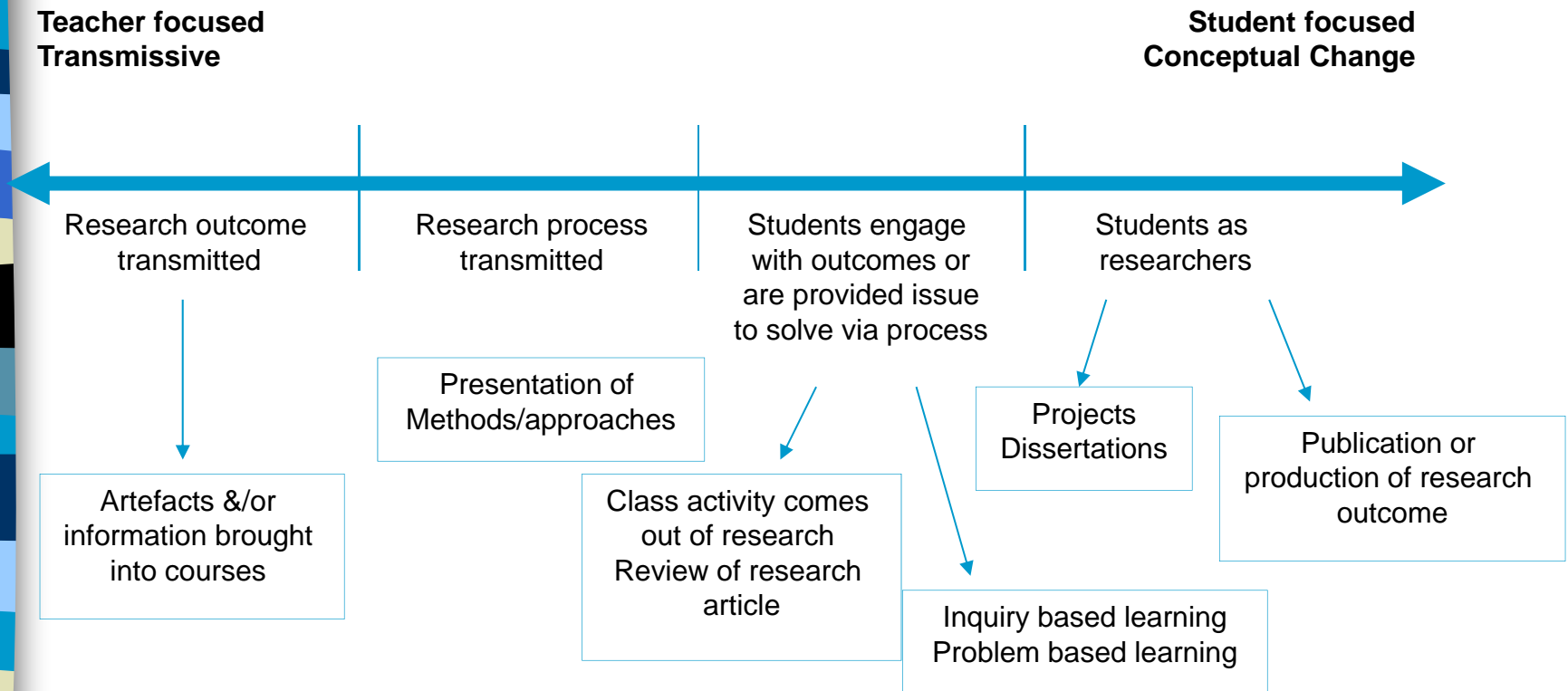
## McGill Definition:

Undergraduate research provides opportunities for students to learn:

- **Knowledge is dynamic, not static.**
- **Methodological skills** used to gather, organize, analyze, interpret, and evaluate data and source material.
- **Advanced critical thinking skills** developed through processes of **discussion and writing.**

Inquiry Network, McGill, 2011

# Defining Undergrad Research



Turner and Wuetherick, 2006



## USask and UAlberta Definitions

- **USask** – followed definition of CUR – UGR is about the involvement of students in creation of new knowledge
- **UAlberta** – followed broad definition covering the spectrum (described above) – emphasis on research as attribute, learning through research-like processes, and doing discovery learning



**HOW CAN UNDERGRADUATE RESEARCH  
FOSTER DEEP LEARNING?**





# Deep Learning and UGR

- Deep learning encouraged through:
  - Personal interest in subject
  - Understanding underlying structures of discipline
  - Allowing time for key concepts
  - Confronting students' misconceptions
  - Active and experiential learning
  - Assessment requiring ideas to be brought together
  - Connects to previous learning experiences
  - Allowing process of learning (make mistakes without penalty)

(Entwistle, 2009)

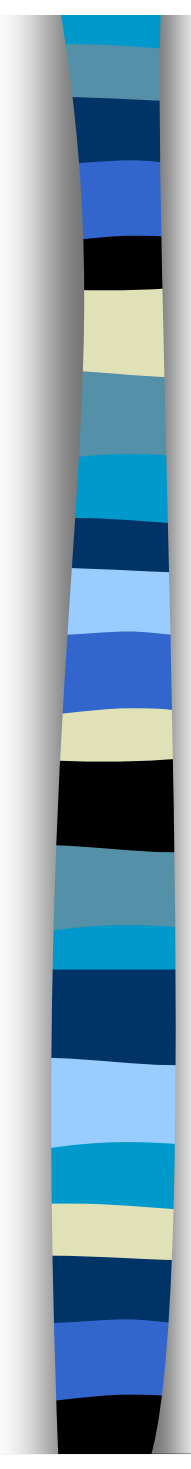


## Other Benefits

- Reflects the needs of the 21<sup>st</sup> century graduate
- Reflects an international call to improve undergraduate education
- Reflects the strategic mission of University



**HOW TO EMBED RESEARCH IN COURSEWORK  
IN WAYS THAT PROMOTE STUDENTS' ACTIVE  
ENGAGEMENT AND DEEP LEARNING?**



What can individual faculty members do?



## Embed research-oriented learning outcomes into undergraduate coursework

- Develop an awareness that knowledge is dynamic, not static.
- Become familiar with methods used to gather, organize, analyze, interpret, and evaluate data and source material.
- Use discussion and writing to develop critical thinking skills and communicate ideas.

Inquiry Network, McGill, 2011

# Examples of introductory courses



Prof. Yogita Chudasama  
“Introduction to Behavioural Neuroscience”



Prof. Chris Buddle  
“St. Lawrence Ecosystems”



Prof. Richard Chromik  
“Properties of Materials in Electrical Engineering”



# What can programs do?

- Creating an Inclusive, Scholarly, Knowledge-Building Community
- Address graduate attributes (UDLEs) through research
- Plan curricular and co-curricular learning experiences
- Postgraduate students as mentors of undergraduates



# The UAlberta approach

- Share examples of instructors who integrate research into their teaching or students doing UGR
- Undertake multiple research studies on student and faculty perceptions and experiences
- Redesign target courses
- Review/revise policies related to UGR
- Funding the Undergraduate Research Initiative





# The USask approach

- Focus on curriculum development and course design
- Funding UGR office
- Fund summer undergraduate research opportunities
- Focus on UGR as part of the research culture of campus
- Review/revise policies to better facilitate UGR



# The McGill approach

- Share examples from range of disciplinary contexts
  - Website: Teaching Snapshots website  
[www.mcgill.ca/teachingsnapshots](http://www.mcgill.ca/teachingsnapshots)
  - Documentary: Sowing the seeds of Inquiry  
<http://www.mcgill.ca/tls/projects/nexus/videos>
  - Faculty Learning Community: Inquiry Network  
<http://www.mcgill.ca/tls/projects/nexus/network>
- Recognize that integrating research into coursework is a complex process and that requires time and support
- Institutionalize forms of support and recognition



What do you envision for the  
U Waterloo approach?

# Thank you!

