

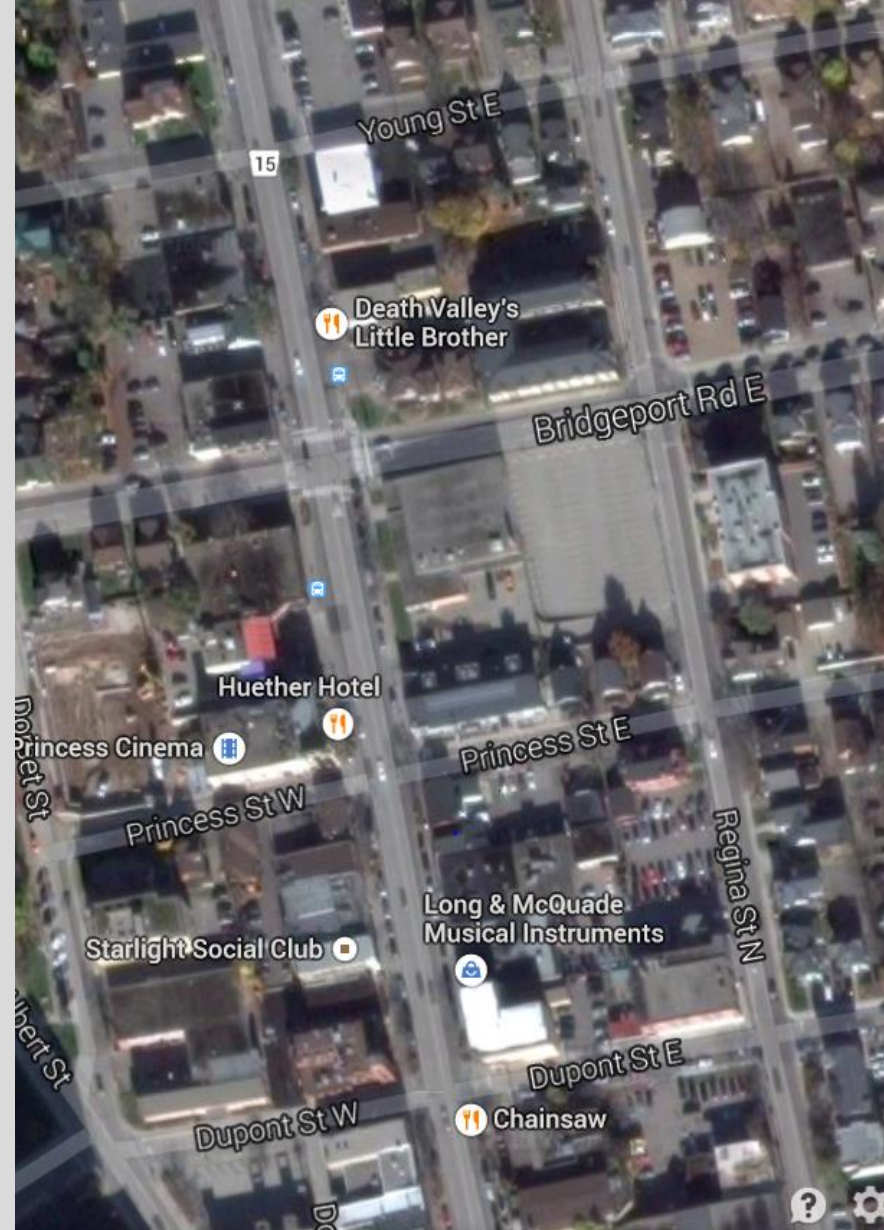
COMPARING **TRADITIONAL** AND **EXPERIENTIAL** APPROACHES TO ENGAGING WITH **THRESHOLD CONCEPTS** IN FIRST-YEAR GEOGRAPHY COURSES.



Dr. Peter Johnson & Grant Gunn
Department of Geography and
Environmental Management

GEO...?

- Geomatics: the science of collecting, analyzing, and visualizing spatial information
- Collects data from satellite, air photos, ground survey. Uses Geographic Information Systems (GIS) to produce map output



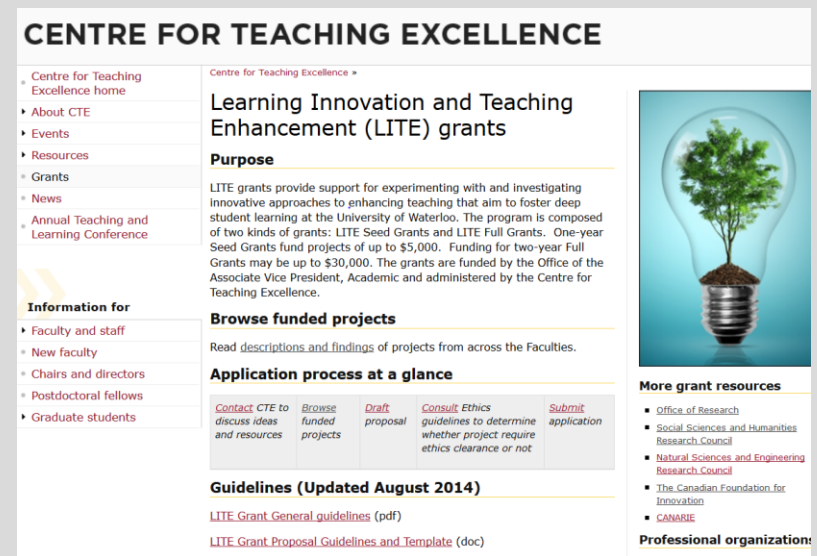
Johnson & Gunn ~ Comparing traditional and experiential approaches to engaging with threshold concepts in first-year Geography courses.



UNIVERSITY OF
WATERLOO

OUR PROJECT

- Supported by a CTE Learning Innovation and Teaching Enhancement (LITE) grant
- Central Question: How effective are experiential techniques to student engagement with the ‘map-scale’ threshold concept?
- Compare new (GEOG 187) vs. current (GEOG 181) introductory Geomatics courses.



CENTRE FOR TEACHING EXCELLENCE

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Learning Innovation and Teaching Enhancement (LITE) grants

Purpose

LITE grants provide support for experimenting with and investigating innovative approaches to enhancing teaching that aim to foster deep student learning at the University of Waterloo. The program is composed of two kinds of grants: LITE Seed Grants and LITE Full Grants. One-year Seed Grants fund projects of up to \$5,000. Funding for two-year Full Grants may be up to \$30,000. The grants are funded by the Office of the Associate Vice President, Academic and administered by the Centre for Teaching Excellence.

Browse funded projects

Read [descriptions and findings](#) of projects from across the Faculties.

Application process at a glance

Contact CTE to discuss ideas and resources	Browse funded projects	Draft proposal	Consult Ethics guidelines to determine whether project require ethics clearance or not	Submit application
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Guidelines (Updated August 2014)


[LITE Grant General guidelines](#) (pdf)

[LITE Grant Proposal Guidelines and Template](#) (doc)

More grant resources

- Office of Research
- Social Sciences and Humanities Research Council
- Natural Sciences and Engineering Research Council
- The Canadian Foundation for Innovation
- CANARIE

Professional organization:



<https://uwaterloo.ca/centre-for-teaching-excellence/teaching-awards-and-grants/grants/learning-innovation-and-teaching-enhancement-grants>



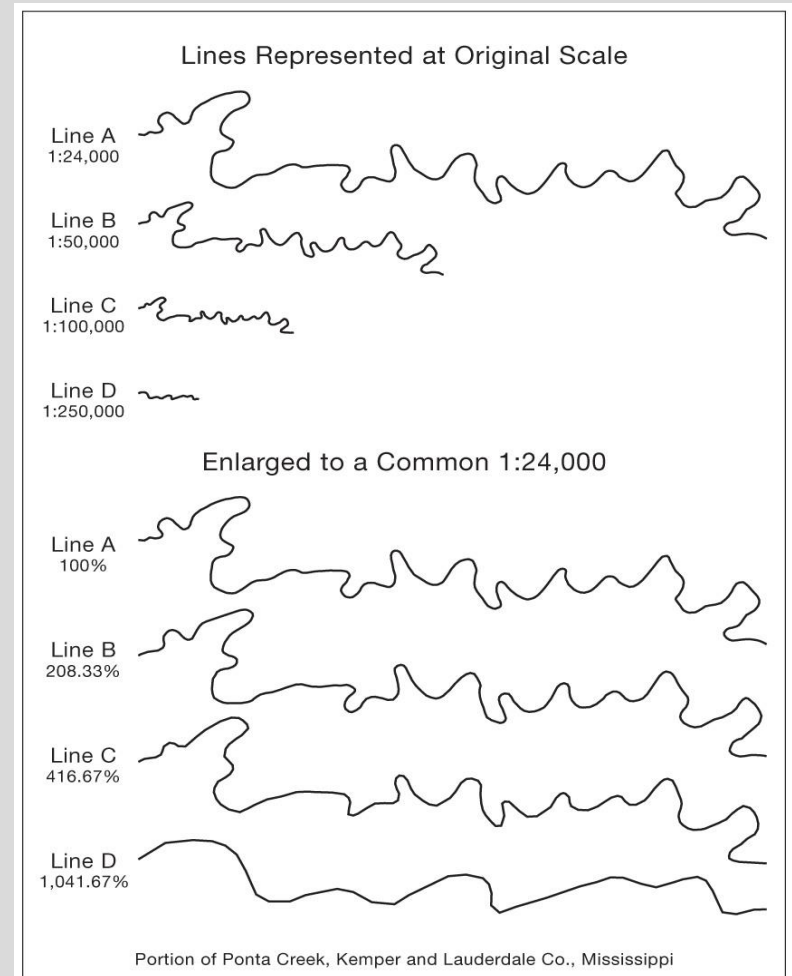
THRESHOLD CONCEPTS & MAP SCALE

- Transformative concepts that may be challenging to learners (Meyer & Land, 2003)
- Significant research in GIS on identifying key threshold concepts, through discourse analysis of core curriculum and publications (Srivastava, 2013)
- ‘Map-scale’ identified as one of three conceptual gateways necessary to pass through moving from novice to expert GIS user



SO WHAT IS MAP-SCALE?

- Representation of an object changes with scale
 - Generalization of a feature
- How long is a coastline?
- Where does a mountain end?
- Influences error and uncertainty of maps



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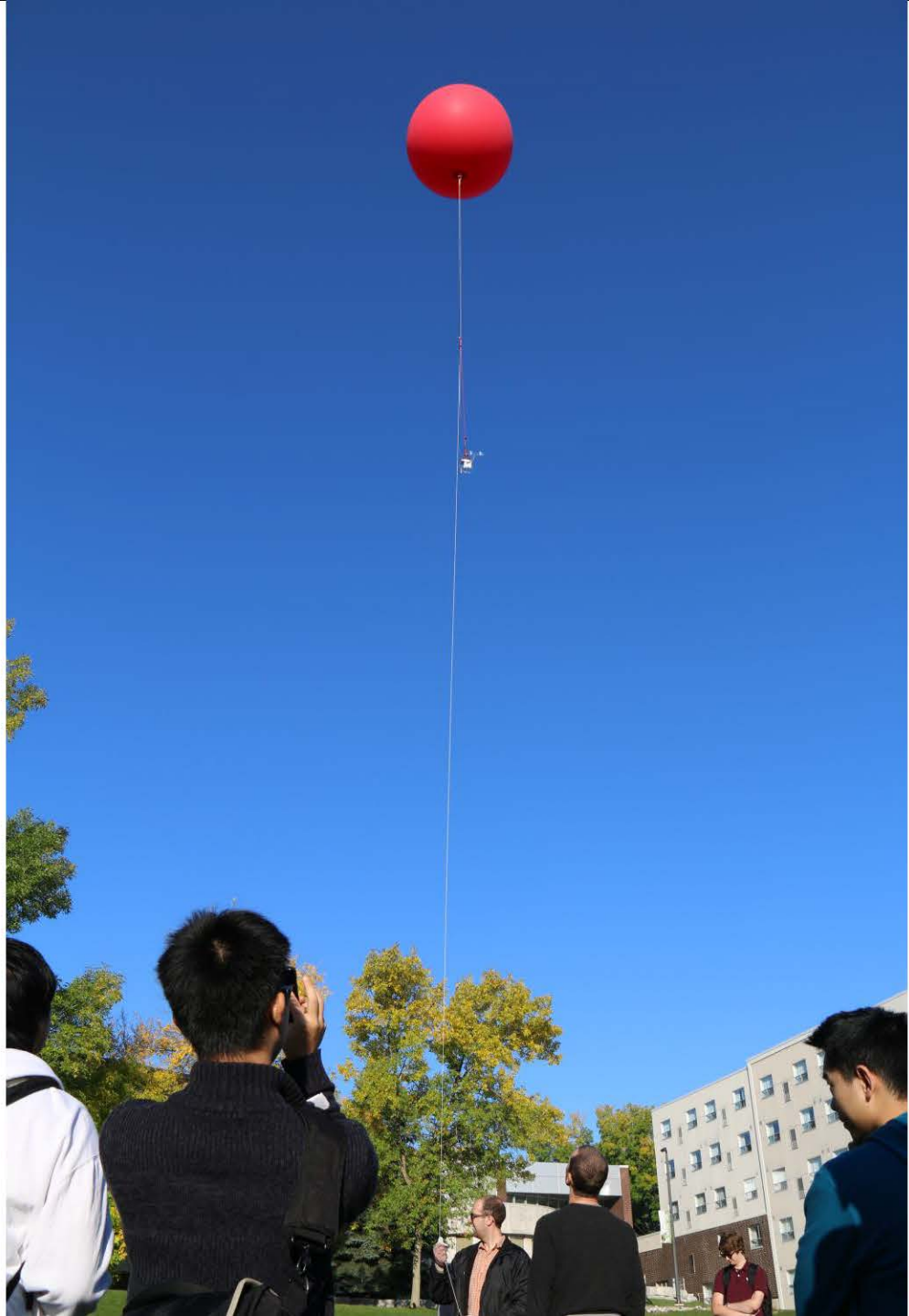


THE TWO COURSES

- **GEOG 181**
 - » ~180 students from various programs
 - » Labs using stepwise instructions, pre-assembled assignments
 - » Focus on creating 'correct' output
- **GEOG 187**
 - » ~ 70 Geomatics majors
 - » Labs involve hands-on collection of primary data
 - » Allow students flexibility to create a variety of output





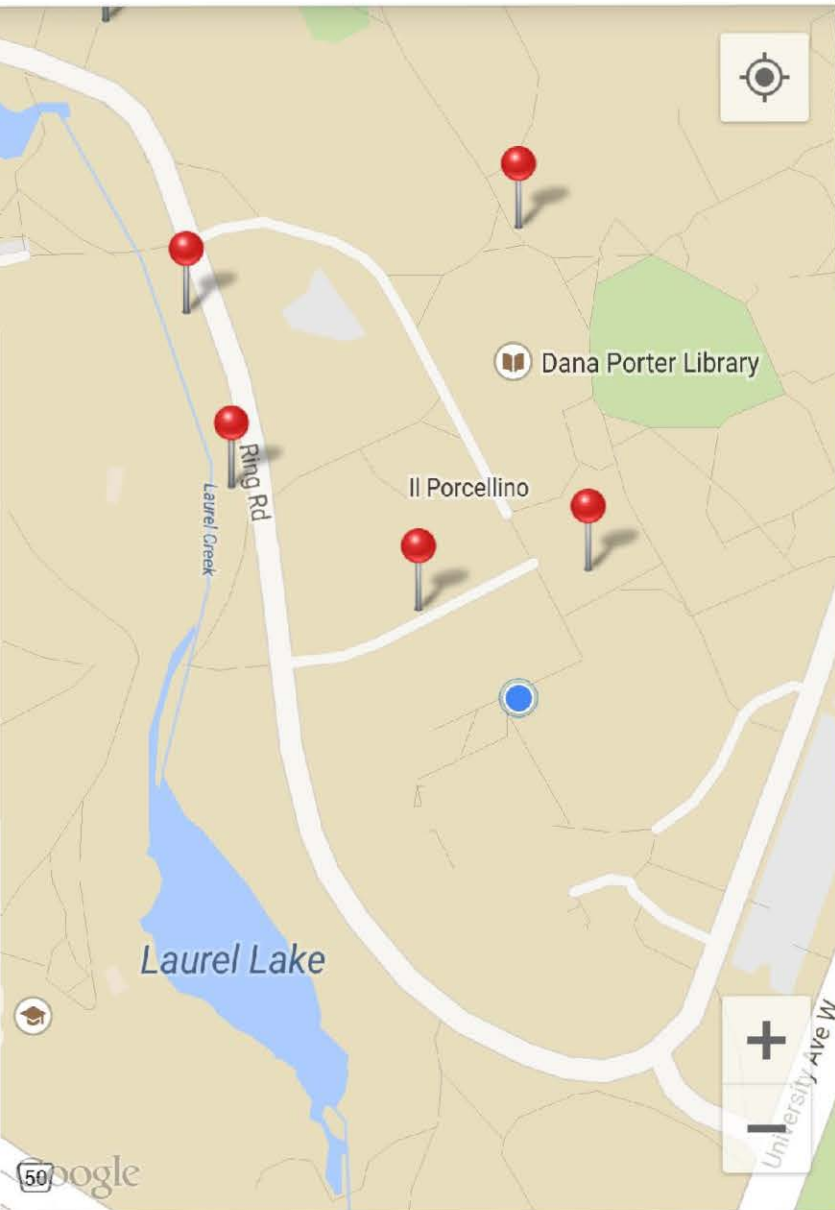






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THE STUDY

- Assessment of map-scale at start of term via survey
 - Students evaluate a series of maps
 - Comment on representation, scale, amount of information displayed
- Assessment of map-scale as demonstrated on final individual EOT project
 - Students evaluated on how information displayed, representation choices, classification/grouping of features



RESULTS – INITIAL ASSESSMENT

- At start of term, classes are comparable
 - Low levels of experience with GIS
 - Similar conceptions of map-scale based on map assessment exercise
 - Understanding of map-scale was generally good in both classes

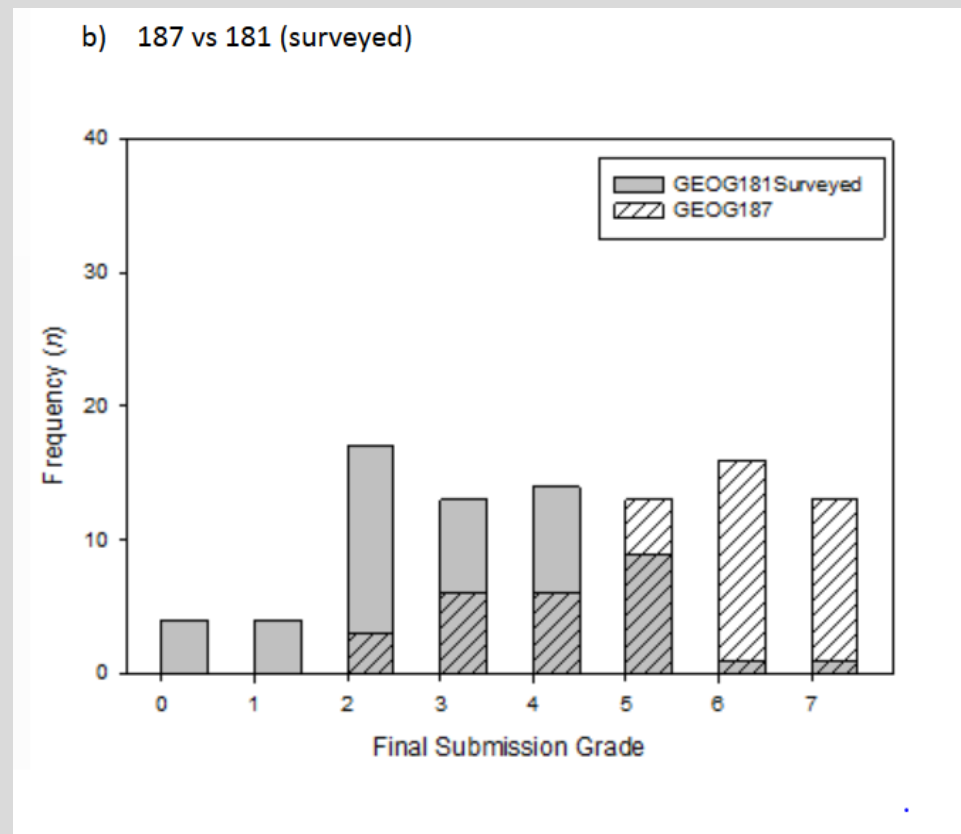


One of three maps evaluated for initial assessment



RESULTS – COMPARISON AT EOT

- Each final submission graded on 7 criteria of map-scale
- Notable difference between classes
- 181 n = 79, mean = 3)
- 187 (n = 66, mean= 5.2)



WHAT DOES THIS MEAN ABOUT THRESHOLD CONCEPTS?

- Are instructional techniques helping students to understand map-scale?
 - Definitely helping to make better maps
- Notable limitations – is map output an acceptable way to track understanding of a threshold concept?
- Are Geomatics students more invested?
- Differences between software tools may enhance differences in final outputs



WHAT'S NEXT?

- Deeper analysis of 7 map-scale criteria between courses
- Basic statistical analysis on initial scores vs. final scores
- Possible follow-up with qualitative research and interviews

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REFERENCES

- Meyer, J., & Land, R. (2003). Threshold Concepts and Troublesome Knowledge: Linkages to Ways of Thinking and Practising within the Disciplines. In C. Rust (Ed.), *Improving Student Learning - Theory and Practice Ten Years On*. (pp. 412–424). Oxford Centre for Staff and Learning Development.
- Srivastava, S. K. (2013). Threshold concepts in geographical information systems: a step towards conceptual understanding. *Journal of Geography in Higher Education*, 37(3), 367–384.

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