

## Stakeholder summary

### **Inquiry-based training improves teaching assistant effectiveness, student outcomes**

Graduate teaching assistants (GTAs) play a growing role in university education, particularly in lab components of STEM courses. A new study from the **Higher Education Quality Council of Ontario (HEQCO)** finds that training GTAs in inquiry-based learning techniques in lab settings can improve both teaching effectiveness and student outcomes.

In the study, inquiry-based learning – a more student-centered and applied approach – is compared to the more common “best practice” model that focuses on content teaching rather than developing inquiry skills. For example, in an undergraduate biology course, the content model might ask what the chemical properties of DNA are, while an inquiry-based model might ask what the results of a particular hypothesis would look like given the known chemical properties of DNA.

#### **Project description**

Conducted in Carleton University’s biology department in the fall 2012 semester, the study (*Teaching Scientific Inquiry: Inquiry-based training for biology graduate teaching assistants improves undergraduate learning outcomes*) recruited 52 biology lab GTAs who were randomly assigned to one of two groups. Both groups completed a two-seminar training program on lab teaching, marking and evaluation skills. One group received training in the inquiry-learning process while the control group received instruction in the best practices model, which features a variety of task-oriented tips gathered from training materials and educational research studies.

Teaching effectiveness was assessed using three measures: the Student Evaluation of Educational Quality inventory, a Cognitive Learning Evaluation and undergraduate students’ final grades, standardized by course.

#### **Findings**

All three measures found higher teaching effectiveness scores for GTAs enrolled in the inquiry-based training group. Students scored the inquiry-based GTAs higher in several areas including learning value, instructor enthusiasm, organization, rapport, assignment feedback and overall instructional quality.

Undergraduate students with GTAs who received inquiry-based training had significantly higher mean course grades than students with GTAs who received the control group training. Overall, inquiry-based training for GTAs was associated with higher teaching effectiveness and improved scientific inquiry skills in undergraduate students.

#### **Recommendations /Further research**

Training GTAs in inquiry-based learning is “an important improvement... a sound and efficient strategy to improve undergraduate teaching in science labs,” according to the study author, who adds that

postsecondary institutions making use of lab GTAs should support such training, where time and resources permit.

Although students said that GTAs trained in inquiry-based learning were better teachers, GTA assessment of their own teaching abilities was not significantly different from that of the control group, which could be explored in future studies. Further research could also examine whether the study findings are applicable to other STEM courses, as well as the long-term recall of inquiry-based learning principles.

The author of *Teaching Scientific Inquiry: Inquiry-based training for biology graduate teaching assistants improves undergraduate learning outcomes* is P. W. Hughes, a PhD candidate in the biology department at Carleton University.