HOW IS SCIENCE TAUGHT? A PROGRAM-LEVEL MEASUREMENT OF HOW WE TEACH 21ST CENTURY UNDERGRADUATES

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Background

There is much evidence for the benefits of active learning (Freeman et al., 2014), especially for less advantaged students (Eddy & Hogan 2014). Despite their importance for our graduates, the use of these approaches by staff can be low (Dolan 2015), and surprisingly little is known about the use of evidence-based teaching approaches at the program level (Wieman & Gilbert, 2014).

Aims

Our main aim was to measure the extent to which evidence-based teaching approaches are used across a Bachelor of Science program at our large, research-intensive institution. We compared our results to a similar Canadian university. We determined how the use of evidence-based teaching approaches differs, within our institution, by class size, year level, and discipline.

Design and methods

We measured the use of evidence-based teaching with the Teaching Practices Inventory (Wieman & Gilbert, 2014). This is a 72-item questionnaire that asks staff objective questions about the use of specific evidence-based practices in a course. It provides scores for each course in eight different categories of instruction. We applied the instrument to all 136 lecture-based courses in Semester 1 of our BSc program. The completion rate was 95% and the average completion time was 11 minutes.

Results

We found a wide range of evidence-based practice in our institution, similar to the comparison institution. The individual teaching categories revealed differences. Our institution was stronger in the Course Information category: a central policy requires written learning objectives for every course. Our institution was weaker in both the In-class Activities and Feedback categories: some practices could be improved easily, such as our common use of videos or demonstrations without asking students to first predict the results. Within our institution the first-year courses scored higher than later year courses in the Supporting Material, Collaboration (between staff) and Feedback categories.

Conclusions

Preparing science graduates with complex 21st century skills is dependent on scientists' pedagogical practices and how they fit together across the curriculum to influence student learning. The Wieman and Gilbert (2014) Teaching Practice Inventory provides actionable data that offers a whole of program view of teaching practices.

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