Canadian Engineering Education Association Research Collaboration
Survey of Canadian Engineering Instructors (SCEI)

This survey is intended to develop a picture the attitudes and practices in engineering instruction in Canada. It was developed by a group of engineering faculty and other educators by the Canadian Engineering Education Association (CEEA).

Goals of the collaboration & survey

The goals of the collaboration:

1. Develop a community of people interested in engineering education research
2. Develop a survey of faculty attitudes toward teaching and about their inclination to collaborate with other instructors and developers, and toward professional development.
3. Collectively model discipline-based educational research methods as part of the process (identifying research method, conceptual framework, collaborating with educational researchers, using piloting with small groups, applying for ethics approval)

Development of the survey

The development followed a Delphi process; this is used to elicit opinions with the object of obtaining a group response by a panel of experts (Brown, 1968). The process allows a large group to elicit a collective response for designing a survey instrument:

1. Elicit a ranked list of proposed questions or question topics from each collaborator. These proposals must address some aspect of the research questions identified above. Collaborators rank their own ideas from highest to lowest priority.
2. Steering committee will collect, organize, and improve consistency of the responses. The steering committee will work with an education researcher to structure the questions in a way to assess validity of the instrument.
3. Steering committee will send a proposal to collaborators for feedback, and finalize the instrument.

We will collectively pilot the tool in with a sample of faculty, and/or focus groups. Collaborators will be encouraged to pilot the instrument on their campus. Ethics approval will likely be required to run the instrument on campuses.

Background to the survey

The survey has three constructs:

1. What are current instructor attitudes about teaching and learning?
2. Current faculty attitudes about the role of the instructor and their duties in both the course and institution.
3. Attitudes toward, and engagement in, professional development activities related to teaching.

Construct 1: Attitudes about teaching and Learning

This construct focuses on general perspectives on teaching and learning.
Some of the questions for Construct 1 were adapted from the Teaching Perspectives Inventory (http://www.teachingperspectives.com/drupal/), a 45-minute inventory that asks questions about learning, motivation, the goals of education, their role as a teacher, the nature of the learners they taught, and the influence of context on their teaching.

Construct 2: Attitudes about role and duties of instructor

Construct 2 was based on the framework of attitudes about teaching by J. Biggs:

J. Biggs, “The reflective institution: Assuring and enhancing the quality of teaching and learning”, Higher Education 41: 221–238, 2001. doi:10.1023/A:1004181331049

The framework identifies three common attitudes about teaching in higher education.

Level 1. Focus: What the student is.

Teachers using a Level 1 theory are struck by student differences, as most beginning teachers are. They see students as easily teachable, or not. They assume a teacher-centred, transmission model of teaching. The teacher is the guardian of knowledge, whose responsibility is to know the content well, and to expound it clearly. It is then up to the student to attend lectures, to listen carefully, to take notes, to read the recommended readings, and so on. Differences in learning outcome occur because students differ in their ability, their motivation, their background, and so on. Thus, when teaching is not effective, it is seen as the students’ fault. Level 1 theory does not promote reflection, whereby the teacher asks the key generative question that all expert practitioners ask: “Is my present practice the best way of doing this?”

Level 2. Focus: What the teacher does.

The Level 2 theory is also based on transmission, but of complex knowledge structures, which require skill in presenting to students, so that learning outcomes are now seen as more a function of how skillful the teacher is. Level 2 theory emphasizes what the teacher does: forward planning, good management skills, an armoury of teaching competencies, ability to use IT, and so on. Retrospective QA uses Level 2 theorising when it talks about teaching competencies, and distinguished teacher awards (see below), as if focusing on what teachers do is in itself an index of student learning. In Level 2, means becomes ends.

Level 3. Focus: What the student does.

Level 3 theory focuses not on teachers, but on teaching that leads to learning. Expert teaching in this sense certainly includes mastery of teaching techniques, but unless the appropriate

learning takes place, it is an empty display. Tyler, fifty years ago, said that learning “takes place through the active behavior of the student: it is what he does that he learns, not what the teacher does” (Tyler 1949, p. 63). Likewise Shuell: If students are to learn desired outcomes in a reasonably effective manner, then the teacher’s fundamental task is to get students to engage in learning activities that are likely to result in their achieving those outcomes (Shuell 1986, p. 429).

Construct 3: Attitude toward and engagement in professional development

These questions seek to identify what professional development resources are available to instructors, what resources they would participate in, and potential barriers for participation in professional development, if any.

Construct 3 is based on a conceptual framework for professional development adapted by one by Amundsen et al. (2005) that categorizes four main focal areas in faculty development: skills focus, method focus, process focus, and discipline focus.

Amundsen, C., Abrami, P., McAlpine, L., Weston, C., Krbavac, M., Mundy, A., & Wilson, M. (2005). The what and why of faculty development in higher education: An in-depth review of the literature.

This framework was adapted for a disciplinary focus to the following framework for professional development activities. The survey asks questions about participation in development activities using the framework below.

Categories	Disciplinary	Transdisciplinary (across institution)
Skills (presentations, discussion facilitation, learning technology)	• Training on using engineering hardware/software in courses. • Personal reading on using engineering hardware/software in courses.	• Training on using general educational software/hardware (learning management systems, clickers, etc.) • Personal reading on general education hardware/software in courses (learning management systems, clickers, etc.) • Training on organization, presentations, writing on a blackboard, etc.
Teaching methods (project-based learning, case studies, active learning, etc.) (including signature pedagogies under disciplinary)	• Workshops/training on teaching methods specific to engineering (education sessions at disciplinary conferences, workshops on teaching design, engineering labs, etc.) • Personal reading on teaching methods specific to engineering (education sessions at disciplinary conferences, workshops on teaching design, engineering labs, etc.)	• Workshops/training on general teaching methods (active learning, service learning, collaborative learning, etc.) • Personal reading on general teaching methods (active learning, service learning, collaborative learning, etc.)
Processes and critical analysis	• Workshops/sessions on teaching and learning processes specific to engineering (course redevelopment workshops, curriculum design, assessment, graduate attributes) • Facilitated sessions on working collaboratively as an engineering department on curriculum design, assessment, etc. • Broad informal holistic discussions on teaching and learning issues with colleagues	• Workshop/session on general teaching and learning processes (constructive alignment, curriculum design, assessment, etc.) • Facilitated sessions on curriculum design, assessment, learning science, etc.
Personal scholarship	• Presenting and seeking feedback to engineering colleagues on teaching and learning innovations • Scholarly work related to engineering education	• Presenting to and seeking feedback from colleagues from a range of disciplines • Scholarly work related to teaching and learning

Questions to address in the analysis:

- Is there a correlate between the focus of professional development activities (Method, Process, disciplinary vs. general) and the levels from Biggs?
- Demographic information – perceptions from new faculty vs. older?
- Is there a perceived need for more faculty development?

Survey of Canadian Engineering Instructors (SCEI)

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We appreciate your time in completing the survey. Individual results will be kept confidential, and aggregate results and analysis will be presented at future Canadian Engineering Education Association Conferences and published publicly.

Demographic Questions

1. How long have you been teaching at the post-secondary level?

- 0-6 years, or if on the tenure-track, currently untenured
- 7-15 years, or recently tenured
- 15-25 years
- > 25 years

2. What percentage of your courses are undergraduate versus graduate courses?

- 0-20%
- 21-40%
- 41-60%
- 61-80%
- 81-100%

3. What percentage of your work time is spent on teaching, averaged over the year?

Note that time on “teaching” would include all related activities including developing course materials, preparation, development, instruction, grading, etc.

- 0-20%
- 21-40%
- 41-60%
- 61-80%
- 81-100%

4. To what degree do you enjoy or not enjoy teaching?

- Greatly enjoy
- Enjoy
- Neutral
- Do not enjoy
- Do not greatly enjoy
- N/A

5. Which of the following teaching goals are important to you. Please put in order of priority.

(Drag the light grey teaching goal to the appropriate dark grey ranking selection)

	First priority	Second priority	Third priority	Fourth priority	Fifth priority
Transmission of information					
Apprenticeship: socializing students into the practice of engineering					
Learner-centered development of understanding: facilitating construction of meaning					
Nurturing students to reach their personal potential					
Social change through education of the next generation of engineers					

6. What influences your decision to make changes in your teaching? Please put in order of priority.

(Drag the light grey influences to the appropriate dark grey ranking selection)

	First priority	Second priority	Third priority	Fourth priority
Personal observation on how a course went the last time I taught it.				
Input from my colleagues and student course evaluations.				
Information from articles, websites, or other literature.				
Professional development activities I participated in: seminars, workshops, etc.				

7. When I am dissatisfied with student learning in my course(s), I believe the most common problems are (please select up to 3 choices):

- [ ] Underprepared students.
- [ ] Under motivated students.
- [ ] Students have inadequate learning skills: require spoon-feeding.
- [ ] Student workload (academic load, or part time jobs) prevents them from spending sufficient time on my course material.
- [ ] Poor curriculum design.
- [ ] Excessive course content dictated by the curriculum.
- [ ] Inadequate resources: such as teaching facilities, instructional technology, and TA hours
- [ ] inability to assess learning or provide high quality feedback to my students due to situational factors
- [ ] Inadequate teaching.
- [ ] Excessive course content I try to pack into my course.
- [ ] Poor quality of classroom instruction leading to poor student engagement

☐ Poor quality of course administration or classroom management

8. If you have any questions of comments regarding this section, or any of the questions please elaborate below:

_____
_____
_____

9. What is the responsibility of the instructor in the teaching and learning process? (Rank the 3 choices from most to least important)

(Drag the light grey responsibilities to the appropriate dark grey ranking selection)

	Most important	Second most important	Least important
The instructor is responsible to know and follow best teaching practices in order to convey to students the important concepts and complex understandings of the content.			
The instructor is responsible to know the content well and be able to clearly articulate it.			
The instructor is responsible to motivate students to learn, provide them with a clear explanation of what it is they are expected learn, and provide learning opportunities in which they can deeply engage.			

10. What is the responsibility of the student in the teaching and learning process? (Rank the 3 choices from most to least important)

(Drag the light grey responsibilities to the appropriate dark grey ranking selection)

	Most important	Second most important	Least important
If the student has the ability to do the work, they doesn't really need to take on any added responsibility.			
The student is responsible to ensure that they have appropriate background knowledge and to develop their own motivation to learn about the subject and do well.			
The student is responsible to attend classes, listen carefully and be attentive, take good notes, do the readings and the assignments, and study.			

11. How can instructors most positively influence student success? (Rank the 3 choices from most to least significant)

(Drag the light grey influences to the appropriate dark grey ranking selection)

	Most significant	Second most significant	Least significant
Use teaching and assessment methods that support clearly stated learning outcomes.			
Speak effectively, provide structured and engaging learning opportunities, and manage the classroom effectively.			
Know the subject very well and explain it very clearly.			

12. What are the important characteristics of an effective instructor?

_____

_____

_____

13. Within my area of engineering expertise, I think of myself as a teaching expert.

- Strongly agree
- Mildly agree
- Neutral
- Mildly disagree
- Strongly disagree

13. What is the most important thing you do with student evaluations of your teaching and your course?

- I look for clues on how well students understand the intended learning outcomes, and if the students agree that the learning assessments align with these outcomes.
- I look for ideas on what approaches might improve my delivery of the material.
- I look to see if students have found lectures to be unclear or confusing. If they do, then I revise my lecture notes to improve my explanations.

14. If you have any questions of comments regarding this section, or any of the questions please elaborate below:

_____
_____
_____

In the questions below, teaching and learning professional development refers to activities that seek to enhance teaching ability, including ideas about how people learn, teaching practices, assessment practices, and scholarly activity.

15. I believe that engaging in the following types of professional development is part of the role of an engineering educator.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Teaching skills development (presentation skills, facilitation, using educational hardware/software, etc.)	○	○	○	○	○
Teaching or assessment methods (teaching design, project-based learning, design active learning, using learning outcomes, etc.)	○	○	○	○	○
Teaching processes (curriculum development, assessment, program improvement, etc.)	○	○	○	○	○
Scholarship (innovating and seeking feedback on teaching approaches, educational research methods, etc.)	○	○	○	○	○

16. Please identify the types of teaching support services you are aware of at your institution, and which you participate in?

Please select a single option for each item as participation entails awareness of the event.

	Am aware of	Participate in
Teaching skills development (presentation skills, facilitation, using educational hardware/software, etc.)	☐	☐
Teaching or assessment methods (teaching design, project-based learning, design active learning, using learning outcomes, etc.)	☐	☐
Teaching processes (curriculum development, assessment, program improvement, etc.)	☐	☐
Scholarship (innovating and seeking feedback on teaching approaches, educational research methods, etc.)	☐	☐

17. Which of the following other T professional development activities have you used in the last 5 years.

- ☐ Attended a seminar on teaching (1-2 hours of professional development)
- ☐ Participated in a workshop on teaching (3 hours to a full day of professional development)
- ☐ Participated in a multi-day workshop on teaching (several day professional development activity)
- ☐ Participated in conference related to education (either disciplinary or not)
- ☐ Learning independently through reading, etc.
- ☐ Lead workshops focusing on T development
- ☐ Internal university funding to support course or program development
- ☐ External funding to support course or program development
- ☐ Internal university grants supporting educational research
- ☐ External grants supporting educational research

18. Please indicate obstacles to participating professional development opportunities. Please rank only the obstacles that apply to you, in order of significance.

(Drag the light grey obstacle to the appropriate dark grey ranking selection)

	Most significant obstacle	2	3	4	5	6	7	8	Least significant obstacle
Timing of event	○	○	○	○	○	○	○	○	○
Availability of event	○	○	○	○	○	○	○	○	○
Location of event	○	○	○	○	○	○	○	○	○
Awareness of event	○	○	○	○	○	○	○	○	○
Relevance of event	○	○	○	○	○	○	○	○	○
Workload	○	○	○	○	○	○	○	○	○
Lack of funding opportunities	○	○	○	○	○	○	○	○	○
Lack of access to expertise	○	○	○	○	○	○	○	○	○
General vs. discipline specific nature of the event	○	○	○	○	○	○	○	○	○

19. If you think about the PD activities you've participated in over the past 5 years, indicate the percentage of those activities that were focused on teaching and learning.

- ○ 0-20%
- ○ 21-40%
- ○ 41-60%
- ○ 61-80%
- ○ 81-100%

20. I think that more professional development is needed for:

a) Training for New Faculty

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Teaching skills development (presentation skills, facilitation, using educational hardware/software, etc.)	○	○	○	○	○
Teaching or assessment methods (teaching design, project-based learning, design active learning, using learning outcomes, etc.)	○	○	○	○	○
Teaching processes (curriculum development, assessment, program improvement, etc.)	○	○	○	○	○
Scholarship (innovating and seeking feedback on teaching approaches, educational research methods, etc.)	○	○	○	○	○

b) Continuing education for experienced faculty

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Teaching skills development (presentation skills, facilitation, using educational hardware/software, etc.)	○	○	○	○	○
Teaching or assessment methods (teaching design, project-based learning, design active learning, using learning outcomes, etc.)	○	○	○	○	○
Teaching processes (curriculum development, assessment, program improvement, etc.)	○	○	○	○	○
Scholarship (innovating and seeking feedback on teaching approaches, educational research methods, etc.)	○	○	○	○	○

21. Does your institution take professional development activities into account during performance evaluations?

○ Yes
○ No

22. If you have any questions of comments regarding this section, or any of the questions please elaborate below:

_____
_____
_____