Evaluating continuous program improvement processes

Susan McCahan

Vice-Dean, Undergraduate

Faculty of Applied Science
University of Toronto

Peter Wolf

Director

Centre for Open Learning & Educational Support

University of Guelph

EGAD Project | Engineering Graduate Attribute Development Project

Sylvie Dore, Ecoles de Technologie Superieure
Brian Frank (project coordinator), Queen's University
Jake Kaupp, Queen's University
Susan McCahan, University of Toronto
Nasser Saleh, Queen's University

Nariman Sepehri, University of Manitoba
Peter Ostafichuck, University of British Columbia
K. Christopher Watts, Dalhousie University
Peter Wolf, University of Guelph

Agenda

Together we will explore the elements of a <u>continuous improvement process</u> to further develop an assessment plan for the accreditation process

Program Overview (Background)

Methodology- Data Collection Plan

Results

Recommendations

Background

- CEAB & NCDEAS - 'graduate attribute expectations' (2008)

- NCDEAS - Engineering Graduate Attribute Development (EGAD) (2011)

Continuous Program Improvement Resources

Welcome

The EGAD Project group has adopted an approach to supporting outcomes-based curriculum development based on the following 4 tenets of effective practice. Through them our intention is to engage engineering educators, students and the engineering community in ensuring that engineering programs graduate students who are ready to meet the needs of an increasingly changing and complex society, while at the same time supporting the tenets of academic freedom and respecting the learning culture and resource parameters of individual institutions.

1. Outcomes-based curriculum development is a process of the continuous improvement of sustainable practices
2. Outcomes achievement is a responsibility shared by faculty and students.
3. There is a culture of autonomy and academic freedom within courses and curriculum in higher education
4. A scholarly approach to curriculum development includes processes that are faculty-driven, data-informed and literature-supported. The process is further supported by a scholarly approach to analysis, application, teaching and assessment.

http://egad.engineering.queensu.ca/

Continuous Program Improvement Resources

Welcome

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Graduate Attributes Evaluation

- The program is assessed, not the students

- Continuous improvement process

- Not required to assess every student

- Not required to assess in every course

- Not required to assess every year

Goal: gather evidence on learning to
     i) Benchmark program
     ii) Improve curriculum

Current Practices...?

Tracking of Program Issues

Accreditation Board Criteria		Issues			
		Pre-Visit	Day 1	Day 2	Post-Visit
Faculty					
3.4.4.4	Experience in teaching, research, and design practice				

Up to now, how have you evaluated the above criteria?

Evaluation Best Practices for:
Experience in teaching, research, and design practice

- Methods

- Descriptors of "good" results

Continuous Improvement Process "Big Picture"

- Are students meeting expectations?

  – In what areas are they successful

  – What areas require improvement

- What data would help us improve our program?

- Example: Retention study

Program Background

- Is the program clearly described?
  - Is there a curriculum map?

- Is the context of the program clear?

A curriculum map is like a process design on paper

It describes how the curriculum should work

What to look for:
Curriculum Mapping

- Information in the map is
  - Accurate, with some depth
  - Identifies intended outcomes from learning experiences
  - Not simply a list of topics "covered"

- Map provides information for each attribute
  - Can include curricular and other experiences

Case Study
Curriculum Map

Case Study
Methodology: Data Collection Plan

- On what does the program propose collecting data (i.e. indicators)?

- What methods are proposed for collecting data?

- Is the data collection plan good?

An indicator is like a <u>sensor</u>: what indicators has the program chosen?

Where have they placed their indicators? Where are the data collection points?

Does the proposed data collection plan make sense?

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Terminology for data collection

Direct measures

- directly observable or measurable assessments of student learning

Indirect measures

- opinion or self-reports of student learning or educational experiences

Valid

- measure what they are supposed to measure

Reliable

- the results are consistent; the measurements are the same when repeated with the same subjects under the same conditions

What to look for:
Overall

- Integrity:
  - Quality of the data collection plan
    - Indicators
    - Assessment points chosen
  - Valid, reliable data collection proposed
  - Plan is cyclic, continuous

- Results will be useful for informing curriculum change

Indicators

What to look for:

- Indicators align with attributes and questions

- Indicators are "leading indicators": central to attribute; indicate competency

- Enough indicators defined to identify strength areas and weak areas within an attribute

- Not too many indicators – resulting in reams of data but little deep information

- Indicators are clearly articulated and measurable

Discussion: Indicators

1) For Attribute #3 (Investigation), which of the following potential indicators are appropriate?

    a)   Complete a minimum of three physical experiments in each year of study.

    b)   Be able to develop an experiment to classify material behaviour as brittle, plastic, or elastic.

    c)   Be able to design investigations involving information and data gathering, analysis, and/or experimentation

    d)   Learn the safe use of laboratory equipment

    e)   Understand how to investigate a complex problem

Investigation: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data, and synthesis of information in order to reach valid conclusions

Case Study
Indicators

How many indicators is enough?
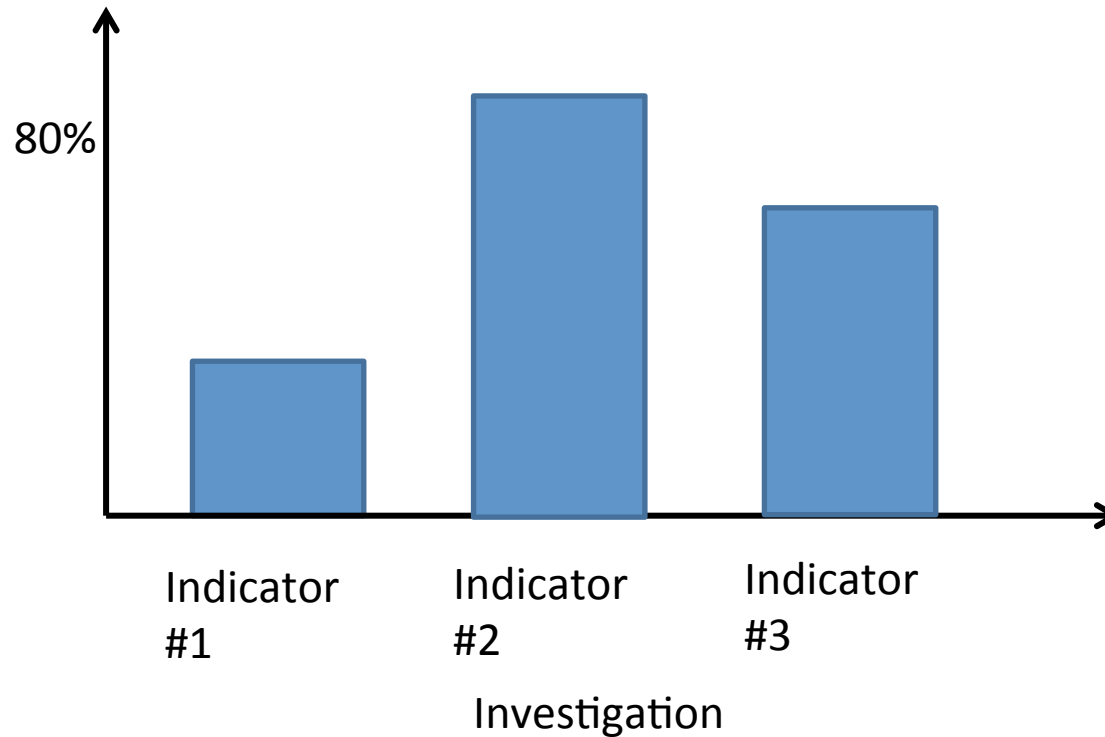
Selecting Assessment Points

- Learning is generally demonstrated through:
  - Artifacts, e.g. written test, report, built project
  - Performances, e.g. oral presentation, observed practice

- What to look for:

Indicators are well aligned to the proposed assessment points

Enough assessment points are utilized

Expectations of performance quality are clear, i.e. the scale is defined

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Why not JUST use grades?

Student transcript

Electric Circuits I	78
Electromagnetics I	56
Signals and Systems I	82
Electronics I	71
Electrical Engineering Laboratory	86
Engineering Communications	76
Engineering Economics	88
...	
Electrical Design Capstone	86

How well does the program prepare students to solve open-ended problems?

Are students prepared to continue learning independently after graduation?

Do students consider the social and environmental implications of their work?

Course grades usually aggregate assessment of multiple objectives, and are *indirect* evidence for *some* expectations

What can students do with knowledge (plug-and-chug vs. evaluate)?

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Triangulation

1. Include opportunities for informal assessment, students' self-reports of learning, and even unsolicited data from placement supervisors or employers

2. Use more than one type of assessment when analyzing data

3. Value all assessment not just major events

4. Use the data gained from assessment to answer questions about authentic learning

5. Look at data across time intervals

Improves reliability and data value

Rubrics: Provide a scale/benchmark

Program Evaluation:
Getting Started

1 Methodology & Process

2 Analysis, Interpretation & Results

3 Recommendations on Priorities & Action Plans

EGAD

Engineering Graduate Attribute Development Project

Dimensions (Indicator)	Scale (Level of Mastery)			
	Not demonstrated	Marginal	Meets expectations	Exceeds expectations
Indicator 1	Descriptor 1a	Descriptor 1b	Descriptor 1c	Descriptor 1d
Indicator 2	Descriptor 2a	Descriptor 2b	Descriptor 2c	Descriptor 2d
Indicator 3	Descriptor 3a	Descriptor 3b	Descriptor 3c	Descriptor 3d

Reduces variations between graders (increase reliability)

Describes clear expectations for both instructor and students (increase validity)

Case Study
Assessment Plan

What to look for:
Results

- Is the data clearly presented? Did the program follow through the data collection plan?

- On which Graduate Attributes is programming focused?

- Where are the focus attributes being best supported?

- Which Graduate Attributes are reported as getting the least attention?

- Where are the strengths: where are students meeting or exceeding expectations?

- What gaps exist in the program? Where are the weaknesses in student learning?

- Where in the program is student development being best supported? And where is there need for better support?

- Timing of data collection & analysis

Case Study
Results

- What do you look for in the Results

Case Study:
Recommendations

- What do you look for in the Recommendations?

  – Analysis of the data is clear and well grounded

  – Results are used to inform curriculum changes

  – Loop is closed:

    - plan in place to implement recommendations

    - plan in place to measure efficacy of changes