Capitalizing on Industry Partnerships to Improve Assessment Processes

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Educating students to shape their lives, their professions, and their societies.
Outline

- Program Overview
- ABET Linkages
- Industry Connections
- GVSU Program Outcomes and Performance Criteria
- Assessment Processes
- Assessment Tools
- Outcomes
- Feedback Loops
- Conclusions
Grand Valley State University

- 4-year, public
- Located in Allendale/Grand Rapids, Michigan
- Approx. 24,000 students
- Master’s granting, liberal arts institution
Grand Valley State University
School of Engineering

- Approx. 700 undergraduate students
- BSE and MSE degree programs
- Electrical, Computer, Interdisciplinary, Mechanical, Product Design & Manufacturing
- 100% co-op for undergraduates
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<th>Fall (Sept - Dec)</th>
<th>Winter (Jan - April)</th>
<th>Spring/Summer (May - Aug)</th>
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<td><strong>2009/2010:</strong></td>
<td>Foundational Courses</td>
<td>Foundational Courses</td>
<td>Open</td>
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<td><strong>2010/2011:</strong></td>
<td>Foundational Courses</td>
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<td>Co-op I</td>
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<td><strong>2011/2012:</strong></td>
<td>Emphasis Courses</td>
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<td><strong>2012/2013:</strong></td>
<td>Co-op III</td>
<td>Emphasis Courses</td>
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ABET Linkages

Why Industry Involvement is Important

• Students must be prepared for engineering practice through a curriculum culminating in a major design experience incorporating appropriate engineering standards and multiple realistic constraints.

• There must be sufficient faculty to accommodate adequate levels of student-faculty interaction, student advising and counseling, university service activities, professional development, and interactions with industrial and professional practitioners, as well as employers of students.
Industry Connections

- Co-op Program
- Senior Projects
- Other Class Projects
- Advisory Boards
- DOER Center
- Campus Events
- Surveys
Assessment During Co-op
(3 per student / 1 each semester)

By Student:
- Evaluation of Experience, Ethics Case Studies

By Employer:
- Evaluation of Student Program

Program:
- Site Visit Evaluation
Industry Involvement at Assessment Process Levels

Student:
- Co-op, Projects

Course:
- Projects

Program:
- Advisory Board, Projects, Co-op, Surveys

School:
- Advisory Board, Senior Projects, Surveys
Co-op Program Involvement at Assessment Process Levels

Student:
- Supervisor + Student Evals

Course:
- Co-op Prep, Academic Components of Co-op

Program:
- Aggregate Co-op Feedback, Faculty Site Visits
Program Outcomes and Performance Criteria

Program Outcome:

Student has the ability to identify, formulate, and solve engineering problems

Performance Criteria:

Student can troubleshoot a technical problem by logical deduction

Student can effectively engage in engineering projects within industry settings
Program Outcome:

Student has an ability to communicate effectively

Performance Criteria:

Student can produce a technical document written to industry standards

Student can effectively present technical information to an audience of peers, customers, or employers
Program Outcomes and Performance Criteria

Program Outcome:

Student has the ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

Performance Criteria:

Student can build a prototype of a design and demonstrate that it meets performance specifications.
Integrated Course
Involvement with Industry

Example from PDM Program:

**Fall:**
- Manufacturing Processes
- Analytical Tools for Product Design
- Dynamic System Modeling and Control

**Winter:**
- Manufacturing Processes
- Advanced Product Design
Industry Involvement at Multiple Levels

**Company A:**

- Sponsors a co-op student (works with student)
- Sponsors a junior-level course project
- Sponsors a senior capstone project
- Serves on Advisory Board(s)
- Participates in surveys (objectives and outcomes)
Feedback Processes

Formal/Direct

► Co-op Site Visit by Faculty
► Project Evaluations
► Surveys
► Advisory Board Meetings

Informal/Direct

► Planning Meetings
► Practice Interviews
► Project Days
Assessment Tools

- **Industry Supervisor Evaluations**
  Three per student (one per co-op semester)

- **Faculty Site Visit**
  Three per student (one per co-op semester)

- **Student Evaluations**
  Three per student

- **Industry Survey**
Outcomes

Quantitative:
- Likert scale summaries
- Set goals/targets

Qualitative:
- Industry comments
Example Outcomes

• Quantitative

Industry Program Survey

Target (3.30/4.00):

GVSU engineering students/graduates can build a prototype of a design and demonstrate that it meets performance specifications (3.32/4.00)

GVSU engineering students/graduates can apply economic/budget considerations to engineering/design problems (3.21/4.00)
Example Outcomes

- **Quantitative**

  **Senior Co-op Survey**

  *(Target 3.30/4.00):*

  The student can build a prototype of a design and demonstrate that it meets performance specifications. *(3.45/4.00)*

  The student can design a system/component/process that is within budget. *(3.25/4.00)*
Example Outcomes

• Quantitative

(Target 3.30/4.00):

Senior Co-op Survey

The student can identify and apply new technological advances within his/her academic discipline. (3.38/4.00)

Industry Program Survey

GVSU engineering students/graduates can identify and apply new technological advances within the discipline (3.09/4.00)
• Qualitative

**Senior Co-op Survey**

‘Student had product design, fixture/process design, and R & D design projects during this co-op assignment. He was able to recognize what was needed for each project and complete them all within the specified deadlines and budget guidelines.’
Example Outcomes

• Qualitative

Industry Program Survey

‘Over all engineering basics (theory) are very competent, but lacking hands on practical experience in manufacturing and design.’

‘Very good at coming up with concepts, figuring out manufacturability issues and improving how components or systems are designed. Very solid on all computer and electrical engineering skills. Analysis (CAE) skills have been very good in some, but non-existent in others.’
How to Reconcile Feedback?

• Student-specific comments
• Program by program
• Breadth of exposure to program
• Industry feedback not always as ‘frank’ depending on affiliation with the program
Outcomes – ‘Frank’ Feedback?

**Industry Program Survey:**
GVSU engineering students/graduates can apply sustainability concepts to engineering/design problems (3.08/4.00)

**Senior Co-op Survey:**
The student takes environmental or sustainable concepts into consideration in his or her work. (3.21/4.00)
Feedback Loops - Levels

Course Level:
- Course Projects

Program Level:
- Senior Capstone Projects
- Co-op Evaluations/Faculty Site Visits
- Industry Surveys
- Advisory Board Meetings
Feedback Loops – When/How

**Course Level:**
- End of semester course assessment
- Semi-annual outcome assessments

**Program Level:**
- Program curriculum meetings
- Annual curriculum review/discussions
- Advisory Board meetings
  [review Assessment Plan for PDM]
Feedback Loops – Examples

Course Level:
- Senior Capstone Project Course Changes

Program Level:
- Changes to freshman/sophomore year in ME
Re-cap/Highlights

• Industry partnerships can provide multiple and varied feedback from constituents
• Multi-level involvement can provide several types and sources of measures for course and program outcomes evaluation
• Feedback from industry must be assessed collectively and filtered
Questions?