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Lessons Learned from the ENGAGE Program: Research Based Time-Effective Tips to Improve Faculty-Student Interactions

Modified from presentation by Dr. Becky Packard (Mount Holyoke College) at the 2011 ENGAGE Strategy Implementation Workshop (http://www.wepanknowledgecenter.org/c/document_library/get_file?folderId=275&name=DLFE-2858.ppt)

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Faculty-Student Interactions Make a BIG Difference in Student Engagement and Success

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Two of the most significant factors affecting engineering student engagement, retention, and academic performance are the quality and extent of students' interactions with engineering faculty. Positive student learning outcomes are correlated with faculty discussion with students about the nature of engineering work and affirmation of students' ability to successfully perform such work.

Dr. Norman Fortenberry
Executive Director, American Society for Engineering Education

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Research Findings: Faculty-Student Interactions Influence Progress and Persistence

- Clear link between faculty-student interactions with student satisfaction and degree completion. Research studies published in Science, produced for the National Science Foundation and the American Society for Engineering Education have all found similar results.

- Students who interact with their professors, and come away with a positive result, are more likely to make progress and persist in the field.

- Interactions with faculty members especially make a difference for female students, and URM students.

- Faculty's manner toward students – either open or closed, responsive or non-responsive – has an impact on student achievement.

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So, what are barriers to increased interactions between faculty and students?

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Even **Small**, **Casual** Interactions Make a Difference!

"I was just about to change my major. I was getting overwhelmed. My professor talked to me and reminded me of the opportunities available to me in the field. I stuck with it, and I'm glad I did."

Amelink, C. and Creamer, E. (2010). Gender Differences in Elements of the Undergraduate Experience that Influence Satisfaction with the Engineering Major and the Intent to Pursue Engineering as a Career. *Journal of Engineering Education. (99)1:* 81-92.

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Even **Small**, **Casual** Interactions Make a Difference!

- It is often a casual off-hand comment from a faculty member that influences a student to stay. Having a comment from a professor- someone viewed as credible and knowing of who would be a good fit in engineering or science- can make a big difference.

- Positive faculty-student interactions are significantly related to satisfaction with an engineering major and the likelihood of employment in engineering.

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Faculty benefit too!

- Students perceive greater accessibility
- Better learning outcomes from students
- Saves faculty time in office hours
- Stronger course evaluations!

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About ENGAGE http://www.engageengineering.org/

- The overarching goal of ENGAGE is to increase the capacity of engineering schools to retain undergraduate students by facilitating the implementation of three research-based strategies to improve student day-to-day classroom and educational experience.

- Focus: 1st and 2nd year engineering students

- ENGAGE strategies improves retention for ALL students and have an even greater impact on underrepresented groups.

- PI: Susan Staffin Metz, Stevens Institute of Technology

- Over 70 partner schools, including OU (through mini-grant)

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About ENGAGE http://www.engageengineering.org/

- E^3s: Integrate Everyday Examples that are familiar to students (in 1st and 2nd year courses)

- FSI: Improve and increase level of Faculty-Student Interaction (among 1st & 2nd year students)

- SVS: Improve Spatial Visualization Skills (among 1st year students with weak skills)

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Selection Criteria for Strategies

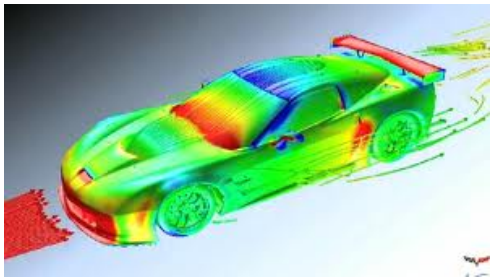
- Solid research evidence that the strategies **improved retention**
- Solid research evidence that the strategies worked for **ALL** students, but had a disproportionately **higher impact on female students**
- Implementation of strategies required a **low level of resources (time and money)** on the part of individual faculty and engineering schools
- Strategies could be implemented by **individual faculty**
- Strategies required a **minimal level of committee involvement** and **change in organizational structure**

Connections Class

•Connections Classes are designed to enhance faculty-student interaction in 1st and 2nd year engineering/STEM courses.

•Faculty spend 15-20 minutes during one class period sharing information about themselves, their research, their interests, how they decided to become a professor, and/or any other information they feel comfortable sharing with the class.

•Students can ask questions and the dialogue is intended to be informal and open.



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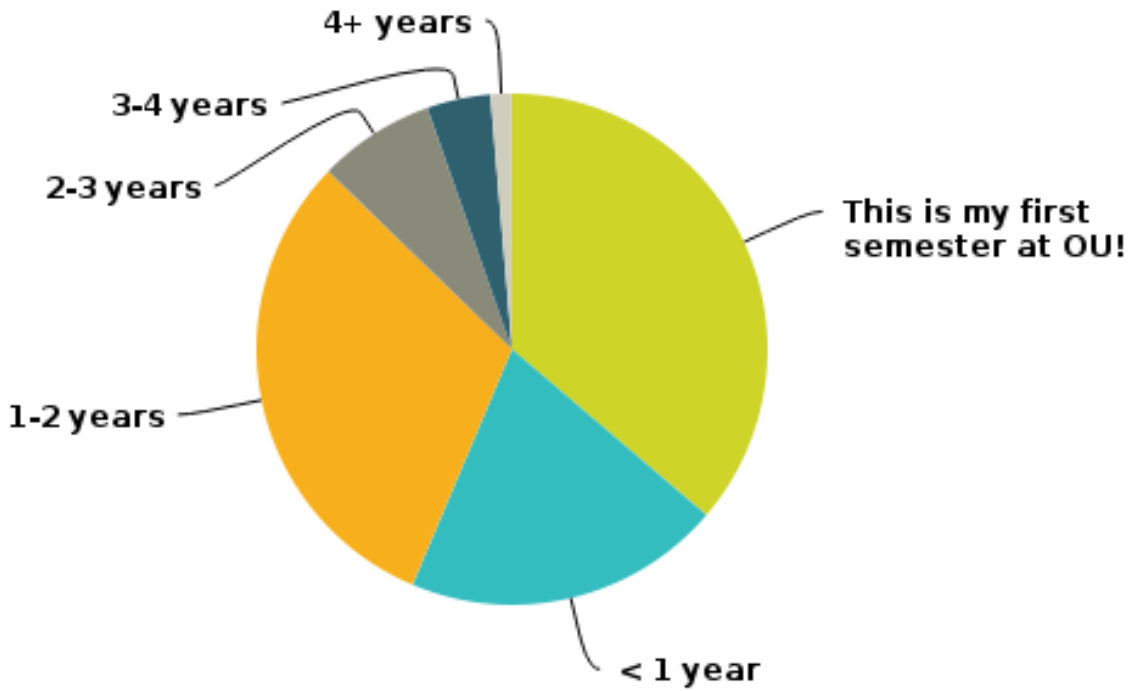
Preliminary Results in EGR Courses

Q4 How long have you been taking classes at Oakland University?

Answered: 149 Skipped: 2



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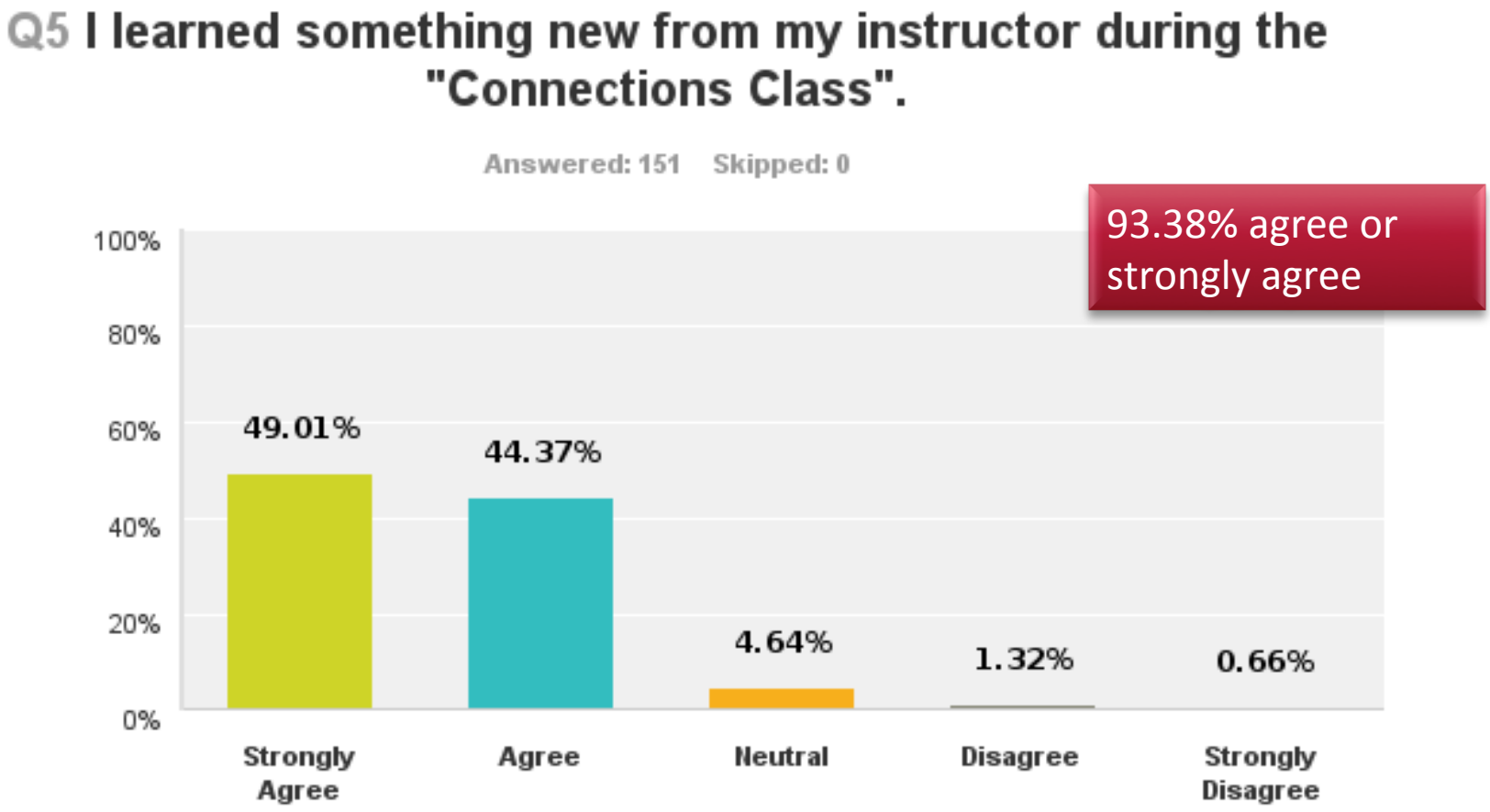
Preliminary Results in EGR Courses



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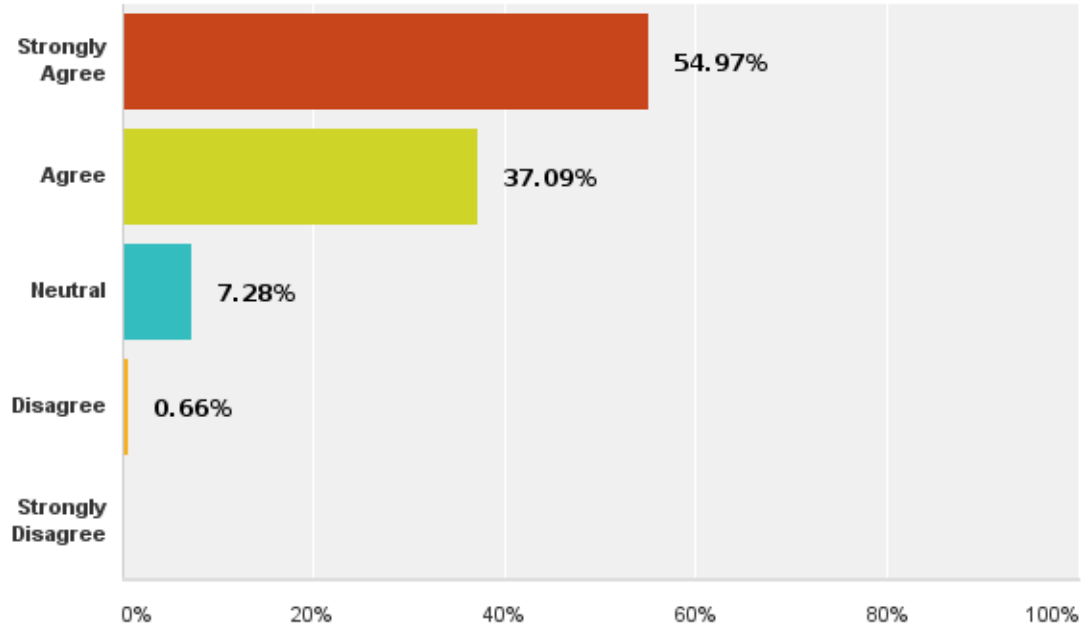
Preliminary Results in EGR Courses

Q8 Do you think there is value in having a "Connection Class" in your engineering classes (one class period where at least a portion of the time is devoted to the faculty/instructors sharing about themselves or their career path and research in an informal dialogue)?

Answered: 151 Skipped: 0



92.1% agree or strongly agree

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Please describe your impressions of your professor during and after the "Connections Class."

- "I liked that he shared more about himself personally. He seems to be involved in a lot of things I, too, am interested in."

- "Human. Most professors will come off as if they do not care what is going on around them, they just want you to shut up so that they can hear the sound of their own voice. Having this time with Dr. X was very helpful to my ability to learn from her."

- "He was genuinely interested in answering our questions and encouraging questions and conversation. He intends to help guide his students in what they want to do instead of simply teaching us"

- "I was very impressed with the research he was doing and his level of knowledge on the subject. It was also interesting to hear about the process of his career up to this point!"

What value, if any, did you find in the "Connections Class?"

- "I found it helpful because the professor gave insight to the real world and their experience as a student that made envisioning my own future easier and made me less stressed of what to expect after graduating."

- "It was really cool to see some real-world applications with the schooling that our professor had. I liked knowing how many possibilities are out there for engineers! I would like to hear about one of the Electrical Engineering PHD professors sometime."

- "Created a real human connection between me and my instructor; seems more approachable and connected. "

- "I found it more refreshing than a usual lecture. It also reassured my belief that an engineering degree is right for me. "

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Other Comments…

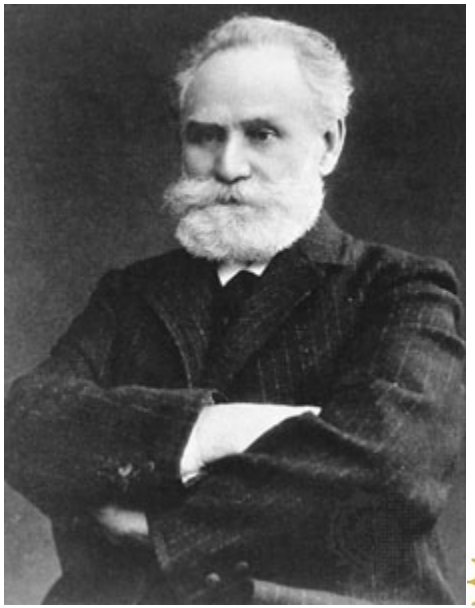
- "I found it very helpful, for as many other engineering students, I am a bit unsure of whether it is the correct pathway for me. "

- "I thought the connection class was a fantastic idea. I think it is something that should be done in every engineering class at least once a semester. Even if a student has attended one before, they will always learn something new and possibly have new questions they didn't have before. "

- "Dr. X handled the time wonderfully and it was interesting to hear about her background. Knowing some of her struggles and experiences makes engineering less daunting. "

My Favorite Comment…

Cookies were good. I felt kind of like Pavlov's dog (conditioning / reinforcing positive behavior). but I can't deny their effectiveness.



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Faculty Approachability Matters

Faculty approachability and accessibility have a direct impact upon student perceptions of their abilities. When faculty are more approachable, they are more likely to ask questions and see themselves as capable.

Ultimately this sense of capability, or what is called self-efficacy, is predictive of GPA and persistence.

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Tip for Approachability: Use Students' Names

- Print a Sheet with Student Photos and Names
- Use a Seat Assignment
- Table Tents with Names

- Example
  - *Before*: "Remember last time we talked about building a bridge."
  - *After*: "Remember last time when **Jennifer** described the bridge she built..."

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Tip for Approachability: Group Office Hours

- Organize students into small groups
- Rotate small groups through Office Hours

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Linking Academics to Future Careers Motivates Students

When students learn about links between their academic coursework and future engineering careers, they are more motivated and engaged in learning. They also view their classes are more relevant and important to their future.

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Tip for Academic-Career Link:

Start Class With a 1 Minute Message

- Reach more students
- Students feel encouraged, invited, informed
- News item, scholarship/internship information
- Research or something new learned at a conference
- Ask students if they have read something or learned something related to the engineering field and allowing a minute at the start or end of class to hear one or two.

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Examples

- "Volunteering just a couple of hours a week on research can be a great thing to do. Professor Sangeorzan is looking for help, so stop by office hours to learn more."
- "A cool way to gain some invaluable engineering experience and be part of a team is to join the OU Formula SAE Team…"
- "Jessica, one of my former students who now works for the EPA, says that she uses what she learned in this class on a regular basis in her work."
- "I recently learned [at a conference/in the paper/ in my research] that…"

Giving Effective Feedback Improves Student Work

- When they understand how they are doing, and learn specific ways to improve, students feel more in control, more capable, and persist when facing challenges.

- High quality feedback on assignments can seem very time consuming.

- Yet without specific feedback, students don't know where they went wrong or how they can improve. When the grading process appears arbitrary or vague, student motivation to improve goes down as does the quality of their work

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Tip: Use a Grading Rubric

- Why?
  - Reduce questions; improve perception of fairness; save time!
  - Grading is more **specific**, transparent and consistent
  - Students learn more effectively

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Sample Rubric

Add a note that combines caution and encouragement

Technical Content (60%)

_____/10 **Experimental Procedure -** Has the experiment been properly conducted and has the data been accurately gathered?

_____/5 **Tabular results** - Are there any errors in the data reduction? Has the data been clearly presented?

_____/8 **Graphs** - Is the graph clear and complete? Does it include descriptive titles, axes, labels, units, and are all symbols or lines identified?

_____/17 **Theoretical Analysis-** Is the actual temperature rise determined correctly? Is the first law model carefully developed for the closed system? Are the calculations related to the first law model correctly done?

_____/10 **Uncertainty analysis** - Is the uncertainty analysis performed correctly? Was the YSI thermometer uncertainty researched?

_____/10 **Conclusion and Discussion -** Does the discussion section clearly address the important results and conclusions? Was a justification provided for the selection of the candidate food sample?

From EGR250 lab grading sheet: X. Wang, B. Sangeorzan, L. Guessous

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Another idea: Invite Questions in Writing

- Idea: Students Submit Questions at End of Class

- Start of class:

  "Please write down a few questions you have right now. As I go through my lecture, I hope some of these questions will get crossed off."

- End of class:
  "Please add any questions that came to mind, and cross off those that got answered. Please turn them in, with no names."

Faculty Expectations Influence Student Performance

Encouraging students to succeed

- Students feel more capable and motivated to try
- Gives students hope
- “Students will float to the mark set.”
- Students work harder and will persist if they feel the professor believes they can improve.

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Sample e-mail

"I noticed from grading the assignments that many people skipped one critical step. I'm posting an example on Moodle that might be helpful, so take a look before Wednesday. This is a step that trips up a lot people. Don't give up."

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Summary: Time-effective Tips

1. Connections class (with or without cookies)
2. Using photos , seating chart, or roster to use names
3. Rotating students through small group office hours
4. Giving a 1 minute message that highlights links between academic learning and careers
5. Using grading rubrics to give effective feedback
6. Inviting questions in writing at end of class
7. Encouraging students to persist

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