

# Helping engineering students learn through reflection

## A sampler of techniques

*When students reflect—or dedicate time to revisit and learn from past experiences—they can gain more from their educational experiences and be better prepared for future action.*

Led by the University of Washington's Center for Engineering Learning & Teaching, the twelve-campus Consortium to Promote Reflection in Engineering Education (CPREE) seeks to understand the many ways in which pre-engineering and engineering undergraduates can benefit from reflection and how educators can help them practice reflection. The reflection activities featured here are real examples from educators on campus and will be featured in a "field guide to reflection activities" to be published by CPREE in the coming year.

### BETTER EVERYDAY CHOICES FOR SUCCESSFUL LEARNING

Some students assume their academic ability is innate, fixed—beyond their control. Sonya Cunningham helps them overcome this mindset with a simple but powerful reflection on how their daily choices can affect their success as learners. Each week, students enter class to find this prompt written on the board:

*Have you made good choices today?*

Class begins with a brief discussion of how students chose to spend their time and how that helped or hindered their progress toward academic goals.

Weekly, informal reflections culminate in short, end-of-quarter papers in which students relate their past and future choices to long-term success as engineers.

**Educator:** Sonya Cunningham, Assistant Director of Diversity & Access, STARS Program Lead, College of Engineering

**Course:** ENGR 102, STARS seminar

### STUDENT-SOURCED CRITERIA FOR GOOD TEAMWORK

Successful teamwork in engineering courses not only results in a job well done but, perhaps more importantly, deeper learning than would be available to a student working alone. In a workshop he often runs in capstone courses, Jim Borgford-Parnell helps students appreciate this and engages them in setting expectations of each other for successful teamwork.

He first helps students recognize how a diversity of perspectives leads to better learning. Then, he asks them to reflect:

*Considering your past experiences in teams, what are the characteristics of exemplary team members?*

Their answers become the criteria for team members to assess each other.

**Educator:** Jim Borgford-Parnell, Associate Director and Instructional Consultant, Center for Engineering Learning & Teaching

**Course:** various

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ENGINEERING EDUCATION

*To learn more about CPREE, contact campus lead Ken Yasuhara at [yasuhara@uw.edu](mailto:yasuhara@uw.edu) and visit [cpree.uw.edu](http://cpree.uw.edu).*

*Join CTL's learning community on reflection this quarter. Visit [bit.ly/uwctl-lc](http://bit.ly/uwctl-lc) for details and registration.*

## PRESENTATION DESIGN DEBRIEF

To help students recognize how they can improve their presentation skills, Kate Moberand has them reflect on a recent presentation with prompts like this:

*Describe your strategy for designing the presentation—text, images, and speaking.*

*Consider how the presentation went and describe which design decisions worked well and which did not.*

A follow-up question encourages students to regard presentation as a learnable skill:

*How might this presentation experience affect how you design future presentations?*

Students write these reflections as one of a series of journaling exercises throughout the quarter.

**Educator:** Kate Moberand, Lecturer, Human Centered Design & Engineering

**Course:** HCDE 231, Introduction to Technical Communication

## FULL-QUARTER RETROSPECTIVE

To help students recognize the value of their entire course experience and connect it to their future plans, Alyssa Taylor reserves part of the last class for reflecting on the whole quarter. After reminding students of the major topics covered in the course, she gives them five minutes to write responses to this prompt:

*Describe at least two things you learned in this course that you expect to prove useful to you in the future.*

To keep her large courses engaging, Taylor regularly asks students to answer a brief question on index cards, which they submit for participation credit. This particular end-of-quarter reflection activity yields substantive responses, showing how students connect specific course experiences with their academic and career aspirations.

**Educator:** Alyssa Taylor, Lecturer, Bioengineering

**Course:** BIOEN 215, Introduction to Bioengineering Problem Solving

## Evaluating impact on students and educators

There are many ways an educator can examine how their students are benefiting from engaging in reflection. In many cases, the content of student responses indicates how substantively students are reflecting. Educators also benefit from these activities, learning more about their students and informing their teaching decisions.

As CPREE works with pre-engineering and engineering educators to help them enhance learning with reflection, consortium evaluation staff will survey students and educators to examine impact. A limited number of students and educators will be invited to be interviewed for more details.