ChE teaching tip

This one-page column will present practical teaching tips in sufficient detail that ChE educators can adopt the tip. The focus should be on the teaching method, not content. With no tables or figures the column should be approximately 500 words. If graphics are included, the length needs to be reduced. Tips that are too long will be edited to fit on one page. Please submit a Word file to Phil Wankat <wankat@ecn.purdue.edu>, subject: CEE Teaching Tip.

TIPS ON EFFICIENT, EFFECTIVE, STUDENT-CENTERED TEACHING

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Several excellent resources contain teaching tips.[1–4] Besides helping faculty improve their classroom environment and their students' learning, some of the recommended strategies enable instructors to better manage their time. Listed below are some techniques that have helped me to teach both more effectively and more efficiently:

- **Class Notes:** *Using "notes with gaps" provides the instructor with maximum flexibility regarding coverage and pace. The instructor can use these materials across a wide spectrum of active learning activities to transform students from scribes to active participants who actually have time to think and process material during class. Additionally, if students must be absent, the instructor can send the day's notes with the gaps filled in. An example of the student version of handouts for the material and energy balance course is posted at <http://www.che.ncsu.edu/bullard/MEB_resources/MEB.htm>.*
- **Lecture Materials:** *If you are asked to teach a course for the first time, chances are someone in your department has taught it before! Rather than generate your own notes from scratch for the first iteration, ask colleagues if they would be willing to share their course materials and use those materials as your starting point. MIT Open Courseware offers lecture notes, assignments, exams, and multimedia content for both undergraduate and graduate chemical engineering courses.[5] Also, materials for several ChE courses are available for general use at <http://www.che.ncsu.edu/bullard/>.*
- **Common Communications:** *Instructors typically send a predictable set of e-mails during the course of the semester. Keeping a file of these "standard" notes saves time in future offerings and helps ensure that you include everything important in your messages.*
- **Student Names:** *Connecting with students, particularly in a large class, is a challenge, and it becomes both more difficult and more important as the class size grows. Develop a process to learn your students' names regardless of how big the class may be. Students are often shocked to realize that an instructor knows who they are, and research shows that they are more motivated to attend class, study hard, and not cheat in classes taught by such instructors.*
- **Early Chats:** *One of my colleagues conducts 10-minute individual interviews with each student early in the semester outside of class to get acquainted. Since time for this can be prohibitive in larger classes, another option is to provide students with your one-page biography, say a few things about it on the first day of class, and ask them to give you their one-page biographies in the next class. Noting their interests and career goals can help you later connect with them individually.*
- **Common Questions:** *Address common questions by providing specific information in the syllabus. Clearly stated policies on late homework and missed tests can minimize the subsequent need for frantic e-mails and time-consuming negotiations.*
- **At-Risk Students:** *Intervene early in cases of students with low test scores or poor attendance to "catch" students who might otherwise fall between the cracks. This is especially important in large classes. Contact students who get below a certain score on your first test and ask them to meet to identify issues that may be affecting their performance. Reaching out to struggling students early sends a clear message that you care about them and want them to be successful, and that knowledge often helps them turn things around.*
- **Team Assignment and Evaluation:** *If students complete assignments in teams, Team-Maker and CATME (<www.catme.org>) are helpful tools that automate the formation of teams based on instructor-assigned criteria. In addition, you can use the same program to collect and analyze peer evaluations of team members' contributions.*

REFERENCES

1. Wankat, P., *The Efficient, Effective Professor: Teaching, Scholarship, and Service*, Boston: Allyn and Bacon (2001)
2. McKeachie, W.J., *McKeachie's Teaching Tips: Strategies, Research, and Theory for College and University Teachers*, 12th Ed., New York: Houghton Mifflin Harcourt (2006)
3. Felder, R.M., *Resources in Science and Engineering Education. <http://www.ncsu.edu/effective_teaching>*
4. Keith, J.M., D.L. Silverstein, and D.P. Visco, Jr., "Ideas to Consider for New Chemical Engineering Educators: Part 1 (Courses Offered Earlier in the Curriculum)," *Chem. Eng. Ed.*, **43**(3), 207 (2009)
5. MIT Open Courseware, *<http://ocw.mit.edu/OcwWeb/Chemical-Engineering/index.htm>* ❐