TWO MINUTES OF REFLECTION IMPROVES TEACHING

Matthew Liberatore
Colorado School of Mines

A laboratory notebook has great utility in recording procedures, measurements, calculations, and ideas in real time, sometimes in a very methodical way and other times as a stream of consciousness. With the development of any experimental technique, a standard operating procedure is written and refined. Analogously, a university classroom is like a laboratory and teaching is sometimes very structured and other times improvisational, and the key result is learning, which is measured on exams and quizzes in most engineering classes. Historically, a professor’s standard operating procedures are his/her lecture notes. These notes are generally static and commonly show their age (wrinkled edges, yellowing paper, coffee stains, etc.). Also like laboratory measurements, good teaching practices are reproducible and backed by significant findings in the literature (e.g.,[1,2]). From this literature, one practice that encourages student learning is reflection (e.g., allowing students 1 to 2 minutes to think about the last concept or example[2]). Reflection encourages students to organize their thoughts and find ways to tie new material with their existing knowledge. Faculty also benefit from reflection.[3] I feel my courses have improved every semester by implementing a simple reflective exercise immediately after each class that I lead (even before checking messages).

Nominally, the reflective exercise takes 1 to 2 minutes and employs free writing to analyze the just-completed class session. Some of the major areas to address include:

- Assessing what worked and what could be improved
- Logging how long each segment of the class (e.g., concept) took to cover
- Listing any pertinent questions that the students asked (or ones that I stumbled on answering)
- Gauging the energy level of class and potential reason (e.g., exam last night, just returned an exam)
- Recording ideas for adding/subtracting content (e.g., too easy, too far off topic)
- Generating ideas to start the next class period (e.g., finish or review a topic, clarify a concept)
- Cataloging ideas for future quiz or exam problems (and filing separately)

The reflective statements are read over in preparation for teaching that specific course material the next time. Another benefit of this technique is improved organization, including not scrambling to squeeze in content before the homework is due or an exam or quiz.

While data on student learning based on reflective change will be difficult to collect, this type of attention to detail can improve the quantity and quality of material learned, the classroom learning environment, and instructor-class dynamic. Overall, the teaching “lab notebook” documents and organizes ideas, criticisms, and questions immediately following a classroom “experiment,” and has led to improved organization and student learning of course concepts in the author’s experience. Finally, the importance of reflection is not a new idea in education as reflective exercises date back to St. Ignatius Loyola and persevere as an integral part of Jesuit schools and universities for more than 450 years.