It is important that pedagogy be the driver of the design of new learning spaces across campus. While space can facilitate learning even the most well designed classroom does not generate learning of its own accord. Various pedagogical approaches allow faculty to leverage what we know about how people learn to their student’s advantage. But faculty need time and mental space to think about how the classroom environment can be used to forward their course learning objectives.

In the article below Elizabeth Sandquist writes about her experience as a teaching assistant in the SCALE-UP classroom (Student-Centered Active Learning Environment for Undergraduate Programs), documenting the logistical complexity of completely flipping a large and challenging upper division lecture course. As the article makes apparent, the learning curve is steep for both faculty and students. Faculty are challenged by student resistance – which, gratefully, becomes less of an issue as faculty master new methods and students adjust to a learner-centered approach. Faculty are also challenged by colleagues who don’t always value innovation even when it is evidence-based. But as Mary Ellen Weimar notes in Learner-Centered Teaching (2nd ed. Jossey-Bass, 2013) a wealth of data makes clear that greater student engagement and significant learning (defined as learning that is retained beyond the course) results when faculty take on the challenge of implement well-designed active learning approaches. You’ll find information on opportunities to embrace more active learning in this issue of On Teaching.

SCALE-ing UP Biochemistry Education
by Elizabeth Sandquist

Elizabeth Sandquist is a PhD student in Biochemistry, who assisted Drs. John Shabb and Kathy Sukalski teaching Biochemistry 301 in the SCALE-UP classroom last spring.

Many teachers use active-learning techniques in smaller courses, but translating this pedagogy to a large class is daunting. In the fall of 2012, the University of North Dakota premiered its first SCALE-UP room. Packed with technology to aid active learning, it accommodates up to 180 students working in small groups at round tables.

What are the best ways for instructors to utilize this exceptional resource to successfully teach a student-centered course? Last spring we took up the challenge of implementing POGIL (Process-Oriented Guided Inquiry Learning) pedagogy to teach an introductory 300-level biochemistry course in the SCALE-UP room. We are currently in our second iteration. The use of POGIL in large enrollment biochemistry courses at the national level is rare, so in many respects we have found ourselves in uncharted territory.
POGIL is a pedagogical approach in which small groups of students work on guided activities to construct knowledge and draw conclusions through data exploration, concept development, and application of new knowledge. It promotes competency not only in teamwork and content but also in process skills such as critical thinking, and problem solving, which are proficiencies considered a priority by the University’s Essential Studies program.

One of the greatest challenges of scaling POGIL to large enrollment classes is the management and grading of the great number of assignments. With POGIL, each session has associated pre-class, in-class, and post-class assignments. This year each student will complete 46 quizzes, 25 short essays, and 25 in-class activities. When multiplied by 150 students, grading and management becomes a formidable task. Blackboard makes it possible. This amounts to about 6700 automatically graded and 4000 manually graded events. Exams are an additional grading burden. Management of this deluge of assignments would not be possible without Blackboard.

It would be tempting to reduce manually graded elements of POGIL into automated grading activities. Students receive immediate feedback through the automated quizzes, whereas three teaching assistants devote about 8 hours a week each to do the manual grading of assignments with a turn-around time of about one week. Eliminating manual grading, however, would cut at the heart of the problem-solving and critical thinking exercises that are the strength of the POGIL approach.

This year we are experimenting with pre-class graded essay assignments which address more complex biochemistry concepts. In addition to submitting their essays before each class, students bring them to class for group discussion and synthesis of a joint essay which becomes part of their in-class activity. Students thus formalize a major concept in their own words in advance of class, receive in-class peer feedback, and, eventually, instructor feedback.

Though there is a lot of individual pre-class preparation and post-class reflection in the POGIL approach, these are designed to support the in-class active learning experience. The grouping of students around computers and near whiteboards in the SCALE-UP room is indispensable to the success of the in-class sessions. Each student is provided with a hard copy of the four-to-six-page in-class activity consisting of a set of short answer problems which are completed and submitted in groups. A designated recorder enters answers into an appropriately designed Word document retrieved from Blackboard. Groups use white boards for graphing, doing calculations, or drawing structures and pathways. They take pictures of their work with their laptop camera and insert the images into their Word document. At the end of the class, the recorder submits the group assignment.

This electronic approach to preparation and submission of in-class activities in combination with Blackboard’s improved on-line grading and feedback options streamlines processing time, promotes group discussions, and improves effectiveness of in-class monitoring of group progress by instructors. The mechanics of in-class group activities will continue to evolve with advances in technology.

To the casual observer, the in-class learning experience may appear a bit odd. Except for two or three times during each 75 minute session the lead instructor is not the focus of attention. Instead, for most of the period, fifty simultaneous discussions are happening. Upon closer observation, one will notice the two co-instructors and three teaching assistants circulating among the tables, listening and watching, and occasionally intervening to resolve a question, nudge a group toward a more productive line of inquiry, or assist with a technical glitch. They are on the alert for moments of epiphany, but more important, the uncovering of misconceptions.

The problems assigned in class can be challenging and complex, pushing students to analyze, evaluate and synthesize concepts in biochemistry. Typically, when three or four groups stumble on the same concept, the lead instructor stops small group discussion and has the class focus as a whole on identifying and resolving the problem. This real-time intervention is one of the distinguishing features of active learning compared to a traditional lecture environment.

Most of the problem spots are anticipated and stopping points are built into the in-class activity. In addition to resolving misconceptions, they help to recalibrate the varying speeds of group progress. During these discussion periods, two or three groups are called upon to report and explain their findings. The instructor affirms or gently corrects the student responses, thereby establishing a baseline of understanding across the class. This scheduling prevents groups from working on a problem for an inordinate period of time and ensures that other, fast-moving groups remain to the end of class.

In-class participation typically exceeds 90 percent — a striking improvement compared to the course’s former lecture-based format. This is in part because of graded group activities, but it is more than that. Students are fully
engaged for the entire 75 minutes. They are not nodding off or using their cell phones. They are on a mission to tackle the day’s assignment.

Because 20 percent of their grade is linked to in-class participation, students are very concerned about missing assignments. We have implemented a liberal excused absence policy which allows students to complete make-up assignments linked to the in-class activity they missed. Self-reporting and direct observations by instructors and teaching assistants helps to identify at-risk students earlier than was possible in the former traditional lecture course.

If POGIL biochemistry is to be effective in a large class, it is critical that each student receives consistent and knowledgeable assistance from instructors and teaching assistants each session. In our current format, teaching assistants meet before each in-class activity to review the assignment and anticipate where students will have the most difficulty. This advance preparation reduces in-class confusion and potential frustrations among students caused by conflicting interpretations. The assignment of instructors and assistants to specific tables for an extended series of sessions provides another level of in-class consistency and encourages the development of trust between students and instructor.

The increased student engagement in the POGIL format results in a larger number of students recognizing that they require assistance. Weekly help sessions are led by teaching assistants, providing students with in-depth personal help. Students with specific concerns about one of the many assignments may post their queries on the course’s Blackboard discussion forum, which is monitored by teaching assistants and instructors.

What about outcomes? In our first iteration of the SCALE-UP approach, a standardized assessment of student learning showed no change in academic performance compared to the lecture-based format. Students self-reported increased engagement in their learning. Their overall evaluation of the course, however, was significantly lower than in its previous format. Perception of instructor performance took the biggest hit. A strong recurring theme among student comments was the desire to re-institute a significant lecture component into the course.

We attribute this dissatisfaction to the stress associated with changing the rules of classroom engagement.

With one year of large enrollment POGIL behind us, we are learning from our mistakes. A colleague at the University of Minnesota has assured us that the initial negative reaction to implementation of a student-centered classroom is common, and that it takes about three years for active learning practices to mature and for students to recognize and want a more engaging educational experience.

The application of active-learning pedagogy to a large class size is indeed formidable. With hard work and planning we have been able to achieve success using the SCALE-UP room. Our particular approach would not be possible without a cohort of talented teaching assistants, extensive reliance on Blackboard and the CILT technical staff, and the willingness of students to step out of their comfort zones.

With increased use of facilities such as the SCALE-UP room across the country, universities — including the University of North Dakota — are on the path to enhanced education in large enrollment classes, instilling in students the concepts and spirit of science.
EVENT

AMERICAN COUNCIL ON EDUCATION NORTH DAKOTA WOMEN’S LEADERSHIP CONFERENCE
September 22, 2014

The University of North Dakota is proud to host the American Council on Education (ACE) North Dakota Women’s Leadership Conference on September 22, 2014.

Join your peers from around the state for a full day of conversation about women and leadership in higher education. Hear about national issues from keynote speakers, Dr. Debra Humphreys, Vice President for Policy and Public Engagement (Association of American Colleges and Universities) and Dr. Kim Bobby, Director of the Inclusive Excellence Group (American Council on Education).

All events are free. Event and registration information will be available in June. Contact Anne Kelsch, event chair, at anne.kelsch@UND.edu with questions or to request more information.

UND.edu/womens-leadership/index.cfm

Faculty Instructional Development Committee and Instructional Development Announce Awards for February, March, and April

The Faculty Instructional Development Committee (FIDC), elected by the University Senate, provides support for course and curriculum development, which goes beyond the means of the individual faculty and academic units. FIDC grants may be used to purchase instructional materials, travel for pedagogical development, travel to make a Scholarship of Teaching and Learning (SoTL) presentation, or other projects related to teaching. To submit a proposal, you will find the necessary information on the OID website. The next deadline is May 1 at noon.

In February, March, and April the FIDC awarded travel grants to the following faculty members:

Matthew Cavalli (Mechanical Engineering), $1,000 to attend the ASEE Annual Conference and to present “Comparison of On-Campus and Distance Learning Preferences in a Junior-level Materials Science Course.”

Matt Gilmore (Atmospheric Sciences), $544.00 to purchase instructional materials for ATSC499: Topics in Meteorology: Thunderstorm Experience Lab.

Surojit Gupta (Mechanical Engineering), $1,000 to attend the Materials Education Symposium.

Suzanne Gonzalez-Smith (Art & Design), $1,000 to attend the 51st National Society for Photographic Educators Conference.

Emanuel Grant (Computer Science), $1,500 to attend the 27th Conference on Software Engineering Education and Training.

Deb Hanson (Occupational Therapy), $1,000 to attend the American Occupational Therapy 2014 Conference and Expo.

Louise Pinkerton (Music), $1,000 to attend the 53rd National Conference of the Association of Teachers of Singing.

Andrew Quinn (Social Work), $1,000 to attend the 4th Annual Assessment Conference.

Manish Rami and John Madden (Communication Sciences & Disorders), $2,070 to purchase a digital scope system for multiple CSD courses.

To discuss ideas and drafts before submitting a proposal, contact Anne Kelsch, Director, Office of Instructional Development (777-4233 or anne.kelsch@und.edu)
Faculty Instructional Development Committee Announces May 1 (noon) Deadline for Mini-Project Grants

Summer Mini-Project Grants support faculty working on significant teaching/assessment projects that go beyond normal course preparation and can be completed in 1-2 weeks of full-time effort during the summer. Projects may relate to individual classes or to department/program needs. For example, designing a major class project or analyzing data collected in conjunction with the department’s assessment plan.

Grants will range from $1000-$2000, depending on the size of the project, and are paid as salary stipends. Applicants are expected to meet university guidelines regarding payment for faculty overload. Proposal deadline is May 1 at noon. Full details are available at oid.UND.edu.

2014 SUMMER INSTRUCTIONAL DEVELOPMENT PROJECT CLUSTER AWARDEES

“The Collaborative Design and Implementation of Transition Activities across the First Year Seminar Program”
Nikki Berg-Burin (History), Nicole Derenne (Art), Merie Kirby (Honors)

“Collaboratively Redeveloping the ChE Lab Sequence – Integrating Team Work, Communication, Course Objectives and Statistical Design Across the Curriculum”
Frank Bowman, Edward Kolodka, Gautham Krishnamoorthy, Robert Wills (Chemical Engineering)

“Supplemental Learning Aids Across an Engineering Curriculum”
Matt Cavalli, Jeremiah Neubert, Lowell Stanlake, Dustin McNally (Mechanical Engineering)

“Integrated Ecological Education to Solve Multifaceted Problems in Biological Conservation and Management”
Robert Newman, Brian Darby, Kathryn Yurknois, Susan Ellis-Felege, Steven Ralph (Biology)

“Spatial Problem Solvers: Enhancing Student Analytical Proficiency Through Problem-Based Learning”
Bradley Rundquist, Michael Niedzielski, Christopher Atkinson (Geography)
The following faculty have been chosen to participate in the Teaching with Writing workshop, May 19-23.

Yee Han Chu (Social Work)  Sarah Mosher (Languages)
Nicole Derenne (Art & Design)  Sima Noghanian (Electrical Engineering)
Reza Fazel-Rezai (Electrical Engineering)  Steven Ralph (Biology)
Sherryl Houdek (Educational Leadership)  Kimberly Stewart (English)
Danielle Jessen (Basic Sciences)  Tom Stokke (Computer Science)
Mary Monette (English)  Donna Turner (English)

SUMMER HOURS:
The Writing Center will be staffed this year throughout Summer Sessions. All UND students, faculty, and staff are welcome to meet with a writing consultant.

To make an appointment, visit writingcenter.und.edu.

UNIVERSITY OF NORTH DAKOTA
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