Strategies for Success

A BENJAMIN CUMMINGS PUBLICATION FOR SCIENCE INSTRUCTORS

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In This Issue

About The Newsletter

Strategies for Success is published as a service to undergraduate science instructors. It is intended to stimulate ideas, disseminate solutions to common obstacles, and update readers on recent developments and findings. We welcome comments, contributed articles, and suggestions for future issues. Please contact the Editor at strategies@aw.com or via fax at (978) 465-6658. Past issues of the newsletter are available on our Web site at www.aw-bc.com/events/strategies.

HELPING STUDENTS LEARN IN GROUPS

Not too long ago, group activities in science lectures were a new idea. Advocates introduced in these pages the many rewards these activities offer: engaging students, forcing them to be more active learners, improving attendance and participation, and more. In this issue, our contributors report on the evolution of group learning strategies—what they've learned about making them successful, how they've broadened their application to assessment, and why they can be the foundation of a completely case-based approach to learning.

We had so much response to this topic that eight pages was not enough to hold it all. Please visit our Web site to read an additional original article by Whitney Schlegel, more about case-based learning, and of course, more of your Sound Off responses. We hope to use the Web in concert with this newsletter to bring you as many strategies as we can in each issue.

Please help us send a big thank you to everyone who contributed their insights into how group activities work best for their students. May this group of active learner/educators be a resource for you and your students.

CREATING PRODUCTIVE GROUPS

Robin R. Patterson, Butler County Community College
robinp@connecttime.net

Group projects have been a part of my teaching repertoire for many years, but it wasn't until I entered a doctoral program in education that I fully understood what my students were experiencing. The program coordinators carefully crafted six groups of six students each based upon our professions and geographical proximity. For the next three years we would work together, learning in community. I had my doubts. But after committing to the group process, I became a believer. This is what I've learned.

Eenie, Meenie, Minee, Mo: Composing a Group

Much has been published on collaborative group stratification. Some recommend heterogeneous representations of learning style, others target multiple intelligences, and others stratify based on grades, SAT scores, or IQ. All of this requires significant instructor effort, such as administering learning style inventories or obtaining information from personal records. I've tried various configurations and now believe that simple self-selection works best.

In order for self-selection to be successful, it's necessary to begin early in the semester by assigning numerous, short, in-class projects and activities that are low risk and have little point value. With encouragement from the instructor, the students tend to move around forming various ad hoc groups

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while assessing their compatibility with others. This allows them to eventually establish a cohesive group. Final groups should not be established until you sense a comfort level in the process (i.e., students stop coming to you to complain about their group members), nor should they be assigned until the drop date has passed.

Lead, Follow, or Get Out of the Way: Becoming a Group

Students should also explore the roles that group members are expected to assume before they form their final group. I provide a handout with four roles that might be assumed and encourage students to take a new role each time they participate in a group project. In short, one should assume the role of "mom," another should be the "gopher," a third should be the "reporter," and a fourth should be the "recorder." The handout they receive has a column where they can record the date and project in which they assumed that role. This lets students know what is expected of them and also sets the stage for situational leadership. My personal experiences taught me, shockingly, that I wasn't always the best leader for a group project. I had to accept that I couldn't always be the leader and learned to assume other roles.

Maximizing Group Participation

While it is the "mom's" job to ensure that each group member participates in the project, it is the instructor's responsibility to design projects that maximize group participation. Mini-projects can be designed that require:

- the mom to assign roles and coordinate the project.
- the gopher to research materials or obtain materials.
- the recorder to compile the information for assessment or sharing with others.
- the reporter to present the group's findings in an informal presentation.

Holding Feet to the Fire: Accountability in Group Projects

As a doctoral student, I was at first uncomfortable with the collaborative model. I had difficulty entrusting others with my learning, so I did my portion of the work, but I also secretly did everyone else's work, too. This didn't remain a secret for long and soon I found that the other group members were expecting me to do it all. This was an important lesson for me. I shouldn't be doing it all but I should be "holding the other's feet to the fire"—insisting that each be accountable.

Many of the group mini-projects I've designed involve the creation of handouts that contain diagrams and text. When each group presents their findings, we use a document camera to share the information with the class. The reporter will address the class, but I ask all group members to come up to the front, not only for moral support, but also to be available for questions. Students soon realize that each member of the group is responsible for the material, not only the reporter.

Getting Voted Off the Island

Invariably there will be times when a group member refuses to be accountable. I make it very clear to my students that they have the right to vote a group member out of any project if he or she is failing to participate but it's a step that cannot be undertaken lightly. First I will meet with the group without the offending member to hear their complaints, followed by a meeting with the potential outcast to ascertain the problem. Because the major group projects I assign require the submission of a group participation journal, there should be documented evidence that participation has been unequal. Finally, I meet with all of the group members to discuss equal participation. If the issues cannot be resolved, the group has my permission to vote the member out.

Transitioning from the Simple to the Complex

Once students have done several mini-projects as a group and have become familiar with the group process, more in-depth projects can be attempted. Projects that are well suited for groups have aspects that require collaboration but also those that require independence. I particularly like projects that have some room for artistic creativity as well as intellectual creativity. For example, the SimParasite project that I assign has students designing a fictitious parasite. The objective is for the student to discover the role of cellular components, such as the mitochondrion or ribosome, in the host-parasite relationship. They must "invent" a parasite, give it a scientific name, delineate its life cycle, and explain the host response. A cut-away model (two- or three-dimensional) depicting the cell components and the interaction of host and parasite is required.

A complex project, such as the SimParasite project, can be successful if:

The instructor provides very detailed instructions. It is essential to provide the students with clear instructions and a grading rubric so there is no question as to what is expected of them. I post the instructions for the SimParasite project on the class web site and provide portions of successful projects as examples. I encourage students to print the grading rubric and assess each other's work (and their own) as they prepare the project.

The work is "chunked." Chunking lets the students divide the work and makes it more manageable.

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Providing timelines with suggested completion dates also facilitates success. Prior to beginning the SimParasite project, students are provided with worksheets that help them to identify the structure and function of cell components. The group divides the work, completes the worksheets, then shares them. The second step is to research the life cycles of several parasites and the third is to research host response to parasites.

The instructor provides suggestions for the role each group member should play. In the SimParasite project, roles include modeler, parasite researcher, host response researcher, and integrator. All of these individuals must work together to design a parasite and its lifecycle, and determine the host response. This information must be conveyed to the modeler, who will design the model, and the integrator, will write the paper describing the role of the cell components in the process. The entire project is based upon the worksheets that were completed in the first phase.

Checkpoints are integrated into the project. I allow ample class time for group work. During class meetings, progress is reviewed to help the groups stay on track. Students may share their ideas with other groups or ask questions. This time is rich in instruction because many "teachable moments" arise. Some projects lend themselves well to peer editing, which is a good checkpoint prior to final submission of a project.

There is opportunity for review. Due to the complex nature of group projects, it is essential for the instructor to review student progress. I regularly check progress by asking, but not requiring, students to e-mail their work to me for review. By using the "Track Changes" feature of my word-processing software, I can make suggestions for improvement. Undoubtedly this is time-consuming, but overall, grading the final submission takes much less time because we have worked together.

The "A" Word: A Final Comment on Assessment

Knowing what is expected of them is the key to students' success in group projects. I assign a single grade to each group member under the assumption that they have all participated in the project. Awarding relatively few points in early-semester mini-projects paves the way for larger projects as the term progresses. Providing detailed grading rubrics and examples of successful projects, reviewing progress, and working on projects in class all have made my experience with group projects and their assessment very successful. ■

Exams with a Group Component

Thomas Terry, University of Connecticut
thomas.terry@uconn.edu

When we think of the function of an exam, we usually think of assessing student learning and providing a grade that (hopefully) is a valid measure of that learning. We rarely give much thought to making the exam a learning experience in itself. As I went through my own learning curve as a teacher, I discovered that my students were very interested in learning what the correct answers to exam questions were, but the longer the time lag before they got this information, the less they cared. If I held a review class to "go over the exam" a few days or a week later, almost no one came. On the other hand, if I posted detailed answer keys online immediately after the exam, over 90% of students checked them within 8 hours. I wished I had some way to get them to look over the exam immediately after taking it, so they could see what they had done wrong and learn from their mistakes, but I couldn't think of a mechanism to do this.

The Group Exam Technique

Several years ago, a colleague at a teaching conference described a group exam technique he used. He gave exams that were shorter than the time available, and used the last part of the exam period for students to retake the same exam in small groups. Most of each student's grade still came from their first, individual, performance, but he allowed a small addition to each student's grade if the group outperformed its highest scorer. This sounded promising, and I tried it out in a large microbiology class. It worked surprisingly well, and I've used it ever since. My students spend the first 40 minutes of the 75-minute period taking the exam individually and recording their answers on a cover sheet that is handed in (students keep the exam). Then they reassemble into previously formed groups of 3–4 students, and each group is given the remaining half hour to move to its own space in the classroom, discuss the exam, and fill out a single group answer sheet. Watching the classroom during this group exam is an educator's dream! In each group, students argue passionately for their answer, and occasionally laugh or even moan when they discover some of their mental follies. They walk out of the classroom having processed the exam thoroughly, and having taught each other.

Grading Rules

Grades are the motivator for students to participate, so I spell out the grading rules very carefully. A group has to score higher than its

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Exams with a Group Component

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best individual performer for the group to earn any bonus points. For example, if the group scores 95 out of 100, and its individual members scored 60, 70, 80, and 90, the group bonus is 5 points. I add that bonus to each member's grade, so their final grades are 65, 75, 85, and 95. I disallow any group bonus greater than 5 points, even if the group scores 10 or even 25 points higher that its highest member (this does happen occasionally). If the group scores lower than its highest performer, the group bonus is zero—I don't subtract points. In my experience, roughly 2/3 of groups earn a bonus on any given exam. The same groups don't always earn bonus points, but over three exams, less than 5% of groups fail to earn a bonus at least once. The average bonus over many semesters has consistently been about 3.6 points. It's important that the bonus not be so large that groups who fail to earn it feel penalized. I've encountered situations where a group included someone who scored so high (e.g., 98 or 100) that the group could not earn bonus points. To prevent this from being a problem, I use a maximum grade of 95 for all individual scores, so every group has the potential to earn a 5 point bonus, but I restrict the maximum grade to 100.

Challenges

Any procedure involving groups is bound to involve some challenges. I've tried various strategies for forming groups, and I've settled on letting students form their own groups with my prodding during earlier classes. I use group activities for other purposes, so by exam time most groups have had some experience working together. I allow students to change groups after each exam, but seldom find the need. Students who rarely come to class are the biggest problem, since they often miss periods when groups form and learn to work together before exams.

Time is the other main challenge. I have not used this format in classes with 50-minute periods—it always takes at least five minutes to collect individual exam papers (even with several proctors), cajole the slower students into handing in their papers, get the groups together and working, hand out the group answer sheet, and deal with problems (students who don't know their group, groups missing too many members to function effectively, etc.). I find a 75-minute class period to be workable, but students must be able to complete the exam in less than 40 minutes in order for the exam to be a useful measure of accomplishment.

This format allows an exam to function both as an assessment tool and a learning experience, and over 90% of students rank it as adding value to their course. As one student said "The only thing I don't like about the group exam is that I used to have the luxury of several days after taking an exam when I could sustain the illusion that I'd done better than I had—now I walk out of the exam knowing all the mistakes I made." ■

Doing Science Collaboratively with Investigative Case-Based Learning

Margaret Waterman, Southeast Missouri State University, mwaterman@semo.edu, and Ethel Stanley, BioQUEST Curriculum Consortium, Beloit College, stanleye@beloit.edu

Investigative case-based learning (ICBL) is a type of problem-based learning that is especially good for structuring collaborative work. ICBL uses realistic cases to engage students in a science topic, turning one of humanity's oldest teaching strategies—telling stories—into a tool for collaborative science learning. Students frequently work as part of a group while they analyze the case and raise questions, as they conduct related scientific investigations, and as they prepare and present their findings. ICBL requires students to develop teamwork, communication, and information management skills—precisely the abilities needed for the workplace and for lifelong learning!

The story that follows is a composite of our own experience with ICBL and that of several biology instructors who have been in our ICBL workshops over the last five years. "Bob Powers" is a fictional instructor using an ICBL case with a general biology class.

Bob Powers Uses ICBL

After years of teaching the macromolecules section of introductory biology, Bob Powers was still dissatisfied with how this part of the course went. The text was fine, the lectures well organized, and the labs were appropriate with students doing exercises in groups. The problem was that the students never seemed to get really interested and the group work seemed artificial.

Bob decided to use an ICBL case he found online (see expanded article for references) to try to hook the students and have them see that the information about macromolecules applied outside the classroom. He had read a little about cases and problem-based learning and thought it might be a way to use groups for more realistic science problem solving.

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Doing Science Collaboratively with ICBL

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During lecture, Bob told his class that they would be using an ICBL case. Very few of his students had used cases before, so he assured them that he would show them how to do this. He then passed out a single sheet that had a short case on one side and a case analysis sheet with room for notes on the other (see below). He asked a student volunteer to read the case out loud.

How Now Mad Cow

by Stacy Kiser, Lane Community College, *www.bioquest.org/lifelines*

My mother and I were driving to a nursery to buy plants for Mother's Day when I asked her for a breath mint. She offered me some gum, but said, "I don't have any breath mints after the big scare."

I said, "Oh give me a break! What big scare?"

She said, "Well, I read on the Internet that you can get Mad Cow Disease from those mints made in England. After all, they're made in Great Britain and they do have gelatin in them."

And sure enough: (a picture of the mint box with "contains gelatin" and "Made in Great Britain" circled in yellow).

Case Analysis Sheet

1. Recognize potential issues and identify major topics.

Working individually, underline or list terms or phrases that seem to be important for understanding what the case is about. Then discuss these with your group.

2. Pose specific questions.

By yourself, or better yet, in a group, think about what you know that is related to the case and its topics. Keep track of questions that arise with the Know/Need to Know chart below.

What do we know?

What do we need to know?

Identify 1–3 questions or issues from the "need to know" list that you or your group wants to explore.

3. Obtain additional references or resources to help answer or explore questions.

List four different resources you think would be helpful.

"Wow. Is that really true?" a student asked aloud.

"We'll see," Bob said. "So what do you all think this case is about?" Several students raised their hands. "Mad cow disease." "Gelatin and getting sick from it." "Wild rumors on the Internet." "Regulation of foods."

Next, Bob asked the whole class if any of them had any experience with some element of the case. How has Mad Cow Disease affected them? Do they ever use gelatin? Has anyone been in the UK lately? By asking these questions Bob was modeling the kinds of questions the students should be asking each other.

Bob next asked the class to work together in small groups discussing the case and raising questions for a few minutes. He asked them to use the case analysis sheet to structure their discussion and, particularly, the Know/Need to Know chart as a way for them to keep track of their ideas. He asked one volunteer from each group to take notes for the group on the Know/Need to Know chart.

Bedlam broke out momentarily as students rearranged themselves and their chairs. Then, quiet conversation began as students began to ask each other questions and to share what they knew about Mad Cow Disease, breath mints, and gelatin. "Gelatin is what???? Cow skins and hooves? Yuck!" "But it's good for fingernails because it's protein." "What is Mad Cow Disease?" "It's a problem with the brain." "Can people get it?" "How?" "Do we have it in the US?" "Is it over or still going on, 'cause we're going to Europe next summer…"

Every group worked intently for 10 minutes or so. When they seemed to be slowing down, Bob called the class back together to hear a sampling of the ideas and questions that the groups had. Here are some ideas the students felt they knew:

- Gelatin comes from boiled cow parts.
- Gelatin contains protein.
- Enzymes are proteins.
- Hair is protein.
- Eggs contain protein. When you boil eggs, you are changing the structure of the proteins; that's what makes them harden.
- Mad cow disease affects the brain. People can get it, and there's no cure. If you're worried, don't eat beef.
- They slaughtered thousands of cows and sheep(?) a couple of years ago in Europe.
- The disease is something you can "catch." It might be caused by a virus.

Students wanted to know:

- What causes Mad Cow Disease?
- If gelatin is a possible source, is the disease caused by a protein?
- How can a protein cause a disease? What do proteins do?
- Can you really get the disease from breath mints?

After this brief discussion, Bob had a pretty good idea of student background knowledge on proteins. Some students had learned quite a bit already. Just hearing each other's ideas showed the students that no one person knew all the answers. They also learned that their fellow students were worth listening to.

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The rest of that week the topic was proteins. In lecture, they learned about prions and Mad Cow Disease, as well as protein structure and enzyme function. Students worked in pairs with molecular models to see how amino acids are put together. In lab, Bob used activities he had done before, but now students seemed to have specific questions about proteins.

Students formed research teams in lab to examine the effects of pH, enzymes, or heat on protein structure. Bob set out some materials to work with: gelatin (hardened), egg whites (runny), a variety of fruits (including kiwi and fresh pineapple), vinegar, water, bleach, and a heat source, but encouraged groups to design and conduct their own investigations. Each group made posters to persuade their peers of their experimental methodologies and interpretations of results. The groups also used a computer simulation of an enzyme lab, varying parameters such as enzyme concentration, substrate, and inhibitors to explore enzyme function. They had to run at least two simulations and explain their results.

For extra credit, individual students could use an Internet resource which Bob had identified for the class to complete—a personal risk analysis of getting Mad Cow Disease.

While students worked on their research designs, Bob observed the groups in action. He noticed what types of resources students consulted, how they worked together in groups, if they were posing questions, presenting results, and generating ideas. Such informal observations are a type of assessment that Bob used to help groups stay on task and work effectively.

In addition to these informal observations, the students produced a variety of products that Bob could choose to grade: the Know/Want to Know sheets, the group research designs, the posters, outputs from the simulations, and the risk analyses.

After using "How Now Mad Cow," Bob asked his students to answer a short survey about learning with cases. (He modified it from one available at www.bioquest.org/lifelines/studentsurvey.doc). The response was positive.

Given these data and his own impressions, Bob felt that the chemistry section went better this time and that he was able to accomplish several goals. First, his students were intrigued by the case, and he and they kept trying to connect their questions to new information discussed during the section on proteins. Second, Bob used collaborative methods in a lecture setting as students analyzed the case. Their analysis served as an informal assessment of what the class as whole already knew about proteins. Third, the case also raised interest in subsequent lectures and lab investigations. In effect, the case and case analysis discussion set a context that made lab and lectures more meaningful. An unintended outcome was that one student shared, "Hey, this is just like what my cousin is doing in med school—working on a case to learn how to use medical information!"

ICBL Is Based on Scientific Inquiry

As we developed ICBL teaching strategies, we found the BioQUEST 3Ps to be helpful as a framework for instruction: Problem Posing, Problem Solving, and Peer Persuasion are based on the actions taken by practicing scientists. Students who learn with investigative cases utilize a similar three-phase approach.

I. Problem Posing: Analyzing a Case

- Introduce the case
- Recognize potential issues and major concepts
- Pose specific questions via Know/Need to Know analysis

II. Problem Solving: Investigating the Questions

- Obtain additional references/resources
- Define problems more by sharing views and concerns
- Design and conduct scientific investigations

III. Peer Persuasion: Supporting Methods and Reasoning

- Produce materials that support understanding of conclusions

Learn More About ICBL

Getting started with any new teaching approach such as ICBL is easier if you are working with other faculty who are also learning to use this new tool. The expanded version of this article, available on the Strategies for Success Web site at www.aw-bc.com/events/strategies, includes information on the many ways ICBL can be used, preparing students for ICBL, assessing ICBL learning, and a wealth of cases and online resources for ICBL in biology. ■

Editor's Note: The authors invite you to attend an NSF Chautauqua Short Course on ICBL in Memphis on July 11–13, 2004 (see www.cbu.edu/~edoody/) and to watch for their forthcoming book of ICBL modules for biology inquiry (Benjamin Cummings, 2005). This article is based upon work supported by the NSF (DUE 9952525), with additional support to BioQUEST from the Howard Hughes Medical Institute and the Education, Outreach and Training Group of the Partnership for Advanced Computational Infrastructure. The views expressed here are those of the authors and do not necessarily reflect the views of the NSF, HHMI or EOT-PACI.

Our readers sound off …
Group activities that work best

Here is a selection of readers' responses to, "What group activities have worked best in your classes?" To read more and longer versions of the responses, visit www.aw-bc.com/events/strategies.

Whenever I assign a team project or lab, I require each member of the team to complete a "task matrix"—an easily designed table of columns and rows. The team (or the instructor) identify the detailed tasks necessary to complete a project or lab (e.g., gather lab equipment, mix solutions, time reactions, gather data, analyze data). After discussing each task, students sign their names (and contact information) next to the tasks they are responsible for, and copies are made for team members. The task matrix becomes a written contract between the students and is handed in with the project or lab report. If there are incomplete or missing parts, only the student responsible for the task is penalized. The matrix builds trust and a sense of responsibility in team work.

—*Andy Neill, Joliet Junior College*

Students today are fairly computer-savvy, so one project that always works well is to have each group prepare a short PowerPoint slide show on an assigned topic. Each topic has several sub-topics that the group members divide up among themselves. For example, subtopics for genetically engineered crops might include Flavor Savor tomatoes, Aqua Advantage almonds, etc. Each student is required to make one slide consisting of a picture and three sentences that succinctly describe the subtopic. I combine their slides into a slide show, which I either show during the next class, or post on our course Web site for later viewing. Because each student must contribute a slide, the work is shared equally. An added benefit is that students are also learning to use technology to create professional-looking presentations.

—*Peggy Lepley, Cincinnati State College*

A typical General Chemistry course requires students to be able to solve word problems. … Traditionally, our lectures were supplemented with recitation sections where a faculty member would answer questions and work an example problem. Attendance was optional and typically poor. Even those who attended passively copied down the solved problem and did not get the benefit of going through the thought process required to set up the solution.

To address this, recitations were restructured to incorporate group problem solving. … Attendance at recitation became mandatory, recitations were limited to 45 students each, and a TA was added to help with grading and the group problem solving sessions. Students are now placed in groups of four of mixed math ability (based on SAT scores). Recitations start with a question and answer period to focus students on the topics in the problem worksheet. Each group is then given a problem worksheet to solve and hand in. Students may ask questions, but the instructor and TA cannot solve the problems—they explain the concepts involved or lead the students to think in the right direction in order to solve the problem. …

To interact with peers effectively in order to solve a problem, students need to verbalize concepts and problem solving strategies. This is a more effective learning tool than memorization and drill. The good student gets better by communicating his or her ideas while the student needing help gets questions answered by a peer who is not intimidating. Students learn that chemistry problems are worked out through logical thinking, not by simply reading a chapter or memorizing its contents.

—*Madhu Mahalingam and Fred Schaefer, University of the Sciences in Philadelphia*

Most students in my introductory microbiology class are future nurses who may present seminars to their colleagues and their communities on detection, symptoms, treatment, and spread of infectious diseases. To help them hone their skills at retrieving accurate information, organizing it into an interesting and coherent presentation, speaking in public, and working as a team member, I require them to work in groups of four to give a presentation to the class about a microbial disease.

Students take the project very seriously because the grade counts more than any single examination grade. They have been extremely creative. One group made costumes, including a long train of bluish-purple circles worn to portay *Streptococcus pyogenes*. Another student dressed in a lab coat to represent a white blood cell who tried to wrestle the bacteria to the ground. Because there was a capsule on the bacteria, phagocytosis was unsuccessful. … These visual activities from their classmates help students retain information that would easily be forgotten if presented in a lecture from the instructor.

—*Peg Johnson, Mesa Community College*

Sound Off

CAREER ADVICE

A career or a job?

The promise of good future employment can be a powerful motivator for today's students, but how well do they make the link between their science courses and the wealth of career options those courses make possible? What kinds of things do you do to help students chart an informed course toward a career? In our next issue, we'll share ideas on this topic and your responses to the question:

When students ask for career advice, what do you tell them?

Sound Off entries will be entered in a random drawing to receive a $100 American Express gift certificate. To enter, please send an e-mail to strategies@aw.com, or fax your response to 978-465-6658 by May 31, 2004.

Strategies for Success Workshops

The Benjamin Cummings faculty development workshop series covers a wide variety of teaching strategies, from techniques for improving student participation to methods for adding media and writing skills into science courses. These free events are open to all life science and chemistry faculty:

March 13, 2004	California State University, Fullerton
March 27, 2004	Montgomery County Community College, Blue Bell, PA
April 3, 2004	University of Minnesota, Minneapolis

To register, please visit www.aw-bc.com/events/strategies or call 800-950-2665 x2460.

Student Scholarships

In 2004, Benjamin Cummings will distribute $15,000 among 20 students who are selected for scholarship awards. For more details about the Benjamin Cummings Biology Prize, Allied Health Student Scholarship, and Environmental Science Scholarship, please visit www.aw-bc.com/scholarships.

Biology Leadership Conference I

Shaping the Future of Introductory Biology for Majors
March 26–28, 2004, Hilton Head Island, SC

Benjamin Cummings is proud to present our first conference devoted to innovation and excellence in teaching general biology. The **Biology Leadership Conference (BLC)** is intended for professors teaching biology biology and pre-professional majors. The conference will include speakers and work groups on three topics: Integrating Technology into Your Teaching, Invigorating and Improving Assessment, and Promoting Active Learning. Attendance is limited to allow maximum participation. For more information, please contact Beth Wilbur at blc@aw.com.

Upcoming Conferences

Human Anatomy & Physiology Society (HAPS) Regional
February 28, 2004, Moraine Valley Community College, IL www.hapsweb.org

American Chemical Society (ACS)
March 28–April 1, 2004, Anaheim, CA www.chemistry.org

Experimental Biology 2004
April 17–21, Washington, DC www.faseb.org/meetings

American Society for Microbiology (ASM)
May 21–26, New Orleans, LA www.asmusa.org

Human Anatomy & Physiology Society (HAPS)
June 11–16, Calgary, BC www.hapsweb.org

General Chemistry Forum

General Chemistry instructors are invited to participate in one of four forum discussions: April 24 in San Francisco, May 1 in Calgary, May 15 in Chicago, and May 22 in New Orleans. Topics include techniques for helping students think like chemists, effective problem solving instruction, online homework and tutorial solutions, and trends in General Chemistry content and figures. If you would like to attend, email Scott Dustan at scott.dustan@aw.com.

Non-Majors Biology Feedback!

We are seeking student feedback on our non-majors biology texts. Students who complete the online questionnaire at www.aw-bc.com/survey/campbell_survey.html will be automatically entered in our drawing to win one of three $100 Amazon gift certificates on June 1, 2004.

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Benjamin Cummings

Benjamin Cummings
1301 Sansome Street
San Francisco, CA 94111
(800) 950-2665
www.aw-bc.com

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