

T E A C H I N G M A T T E R S

The Newsletter of the Center for Effective University Teaching

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ACTIVE LEARNING EDITION

Fall 2003



What is "Academic Teaching"?

- Miriam Rosalyn Diamond

I was having lunch with a colleague the other day, when he asked me to clarify the difference between "academic teaching" and "interactive instruction." The question took me by surprise, because I don't distinguish between the two. Upon further discussion, I came to understand that he was under the impression that the former meant the professor stood in front of the class and lectured on theories or facts, while courses where students actively participated were not being conducted in a manner that was considered "academic."

Webster's Dictionary defines *academic* as "based on formal study"*. The implication is that anything informal is non-academic. A great deal of time, research, planning, organization, and effort in facilitation goes into running interactive lessons effectively. However, the interchange itself has a spontaneous character, which may give it an informal quality. Even when students are assigned specific roles and tasks, the element of give-and-take may come across as more casual than the "sage on the stage" method of instruction.

A new element often emerges in a course when a cooperative element is introduced – ENERGY. The climate of the room is transformed. Students are thinking, debating, clarifying, and talking out the task. They begin

to take ownership of it. They connect with one another and stretch the boundaries of their individual levels of comprehension. As an instructor, seeing students actively engaged with the topic and in their own learning process ranks among my most rewarding moments of being in the classroom.

Research demonstrates over and over that students are better able to apply concepts and comprehend information when they have worked with the material interactively. Participatory learning shifts students from mostly physically passive to active, which increases long-term retention of data and concepts. Furthermore, including an active learning component in the curriculum can support a variety of learning styles, including verbal, spatial, and/or social learners.

Sound new-fangled? Interactive learning has actually been around a while. Ask anyone who has been involved in a laboratory course. These classes are designed to promote discovery, as well as teach research, design and problem-solving skills. Students often work in pairs or teams to solve a problem or discover what happens when they follow a set of directions. At times, it may be appropriate to use this approach to transform our classes into mini-laboratories – in the

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* Merriam Webster's Collegiate Dictionary (1994), Springfield, MA: Merriam-Webster, Inc., 6.

humanities and social sciences, as well as the sciences and engineering.

I am often told by faculty "Interactive learning sounds nice, but I have so much material to cover that there isn't any class time for anything else." The problem with "covering" material is that there is no evidence that students actually understand – much less learn – the subject matter. Researchers on instruction have discovered that introducing less material in classes and spending more time working with that material is actually more effective in expanding student knowledge than conveying vast amounts of information. The implication is that we must be selective about what we want students to know, understand, and be able to do by the end of the course or the start of the following course (or co-op placement or job) and focus on those items. This is a definite challenge – particularly when teaching on the quarter system. Yet, it's a challenge I would rather take than spending my energy organizing and presenting material that is likely to be forgotten after the next exam – if not sooner.

Another reason many faculty are reluctant to utilize participatory learning is class size. However, there are methods that can be used even in classes of 100 or more. These include taking student opinion polls, assigning short at-desk tasks and taking a survey of responses, and posing a question for students to address in pairs or small groups to solve a problem and then presenting a solution against which they can check their work.

I maintain that interactive classes can be highly academic – in the sense that they provide opportunities for students to work with concepts, promote higher-order thinking skills, test their ideas and understanding of material, as well as share and debate perspectives in a safe, structured environment. They also practice articulating opinions, communicating the reasoning behind those opinions, active listening and responding to others, and solving problems collaboratively. In addition, these types of lessons increase the likelihood that genuine learning will occur during class time.

Webster also defines academic as "having no practical or useful significance." Let us hope that cannot be said of our classes. ❁

Miriam Diamond is Associate Director of the CEUT.

Want to know more about active learning? Here are some additional resources:

Bonwell, C. and Eison, J (1991) *Active Learning: Creating Excitement in the Classroom*. ASHE- ERIC Higher Education Reports. George Washington University: Washington DC.

Davis, B.G. (1993) *Supplements and Alternatives to Lecturing: Encouraging Student Participation*. *Tools for Teaching*. Jossey-Bass : San Francisco. 131-139.

Mazur, E. (1997) *Peer Instruction: Getting Students to Think in Class*. In Redish, E. F. and Rigden, J.S. ,ed.s. *The Changing Role of Physics Departments in Modern Universities, Part Two: Sample Classes*, AIP Conference Proceedings 399, American Institute of Physics, Woodbury, New York. 981- 988. Available at http://mazur-www.harvard.edu/library/publications/pdf_files/Pub_244.pdf

Myers, C. and Jones, T. B. (1993) *Promoting Active Learning*. Jossey-Bass: San Francisco.

Nelson, C. (2001) *What is the Most Difficult Step we must Take to Become Great Teachers?* *National Teaching and Learning Forum*, 10,4,no. 12. Reproduced at <http://sll.stanford.edu/projects/tomprof/newtomprof/postings/327.html>

Rojas, L. (1997) *Ten Strategies for Personalizing Instruction in Large Lecture Room Settings*. Paper presented at Sixth National TA Conference, Minneapolis, MN.

Zull, J. E. (2002) *The Art of Changing the Brain*. Sterling, VA: Stylus Publishing, Inc.

Books may be borrowed from the CEUT library at 225 Hayden Hall.

Active Learning Quotes

Learning is not a spectator sport. Students do not learn much just by sitting in class listening to teachers, memorizing repackaged assignments, and spitting out answers. They must talk about what they are learning, write about it, relate it to past experiences, apply it to their daily lives. They must make what they learn part of themselves.

- Arthur W. Chickering and Zelda Gamson

While a teacher can give us information, a teacher cannot give us wisdom. Wisdom is not an object to impart. We ourselves must have a direct experience of opening fully to change and potential.

- Joan Halifax

Or, put another way-

Good teachers never teach anything. What they do is create the conditions under which learning takes place.

-S. I. Hayakawa,

I hear and I forget. I see and remember. I do and I understand.

-Chinese Proverb



A word from the Director...

- Donna Qualters

Welcome Back! As we start a new academic year I'd like to invite you to explore the Center for Effective University Teaching website at <http://www.ceut.neu.edu>. We are embarking on an exciting year and we've planned many activities and resources to support faculty and teaching assistants as we start teaching in a semester model. We have also added additional links on the Course Evaluation TCE system which will answer many frequently asked questions.

We are continuing our popular student mid-term feedback SGID program for semesters. We are able to conduct SGIDs in 15 - 20 classes each term. So if you would like some feedback

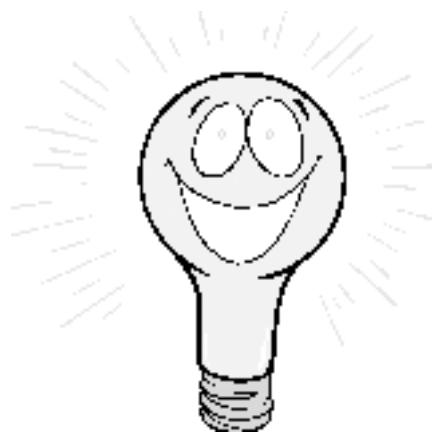
on your course during the semester, look for the ad in this newsletter or our NUNET announcement as we sign up classes on a first come, first serve basis. There are additional resources on our website if you'd like to develop your own feedback tool as well.

In addition, we will be offering book groups, discussion groups, feedback tools, peer review, video-taping, "house-call" workshops and a variety of other activities tailored for your individual or department needs. Please feel free to contact us at extension 8583 if we can help. Have a great semester! ❁

Donna Qualters is the Director of the CEUT and Associate Professor in the School of Education.

Ideas for the First Day of Class

- Joyce Polvacs Lunde



Beginnings are important. Whether it is a large introductory course for freshmen or an advanced course in the major field, it makes good sense to start the semester off well. Students will decide very early—some say the first day of class—whether they will like the course, its contents, the teacher, and their fellow students.

The following list is offered in the spirit of starting off right. It is a catalog of suggestions for college teachers who are looking for fresh ways of creating the best possible environment for learning.

These suggestions have been gathered from University of Nebraska at Lincoln professors and from college teachers elsewhere. The rationale for these methods is based on the following needs: to help students make the transition from high school and summer activities to learning in college; to direct students' attention to the immediate situation for learning—the hour in the classroom; to spark intellectual curiosity—to challenge students; to support beginners and neophytes in the process of learning in the discipline; to encourage the students' active involvement in learning; and to build a sense of community in the classroom.

Here, then, are some ideas for college teachers for use in their courses in the new academic year:

- Hit the ground running on the first day of class with substantial content.
- Give a learning style inventory to help students find out about themselves.
- Direct students to the Tutoring Program for help on basic skills.
- Tell students how much time they will need to study for this course.
- Explain the difference between legitimate collaboration and academic dishonesty; be clear when collaboration is wanted and when it is forbidden.
- Find out about students' jobs; if they are working, how many hours a week, and what kind of jobs they hold.
- Greet students at the door when they enter the classroom.
- Give a pre-test.
- Start the lecture with a puzzle, question, paradox, picture, or cartoon on slide or transparency to focus on the day's topic.
- Elicit student questions and concerns at the beginning of the class and list these on the chalkboard to be answered during the hour.
- Have students write down what they think the important issues or key points of the day's lesson will be.
- Ask students to write out their expectations for the course and their own goals for learning.
- Stage a change-your-mind debate, with students moving to different parts of the classroom to signal change in opinion during the discussion.

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- Conduct a “living” demographic survey by having students move to different parts of the classroom: size of high school, rural vs. urban, consumer preferences.
 - Give students two passages of material containing alternative views to compare and contrast.
 - Distribute a list of the unsolved problems, dilemmas, or great questions in your discipline and invite students to claim one as their own to investigate.
 - Ask students what books they read over summer.
 - Ask students what is going on in the state legislature on this subject which may affect their future.
 - Collect students’ current telephone numbers and e-mail addresses and let them know that you may need to reach them.
 - Diagnose the students’ pre-requisite learning by a questionnaire or pre-test and give them the feedback as soon as possible.
 - Organize. Give visible structure by posting the day’s “menu” on chalkboard or overhead.
 - Use multiple media: overhead, slides, film, videotape, audiotape, models, sample materials.
 - Use multiple examples, in multiple media, to illustrate key points and important concepts.
 - Make appointments with all students (individually or in small groups).
 - Hand out wallet-sized telephone cards with all important telephone numbers listed: office, department, resource centers, teaching assistant, lab.
 - Print all important course dates on a card that can be handed out and taped to a mirror.
 - Tell students what they need to do to earn an “A” in the course.
 - Stop the world to find out what your students are thinking, feeling, and doing in their everyday lives.
 - Have students write something.
 - Invite students to ask questions and wait for the response.
 - Probe students’ responses to questions and their comments.
 - Put students into pairs or “learning cells” to quiz each other over material for the day.
 - Give students an opportunity to voice opinions about the subject matter.
 - Have students write questions on index cards to be collected and answered the next class period.
 - Learn names. Everyone makes an effort to learn at least a few names.
 - Set up a buddy system so students can contact each other about assignments and coursework.
 - Find out about your students via questions on an index card.
 - Take pictures of students (snapshots in small groups, mugshots) and post in classroom, office or lab.
 - Help students form study groups to operate outside the classroom.
 - Solicit suggestions from students for outside resources and guest speakers on course topics.
- Excerpted from 101 THINGS YOU CAN DO THE FIRST THREE WEEKS OF CLASS by Joyce Powlacs Lunde , August 1986, The Teaching and Learning Center - University of Nebraska, Lincoln. Reprinted with permission.*
- Available at Tomorrow’s Professor Listserv,
<http://ctl.stanford.edu/Tomprof/postings/168.html>*

Conjuring Collisions Between Theory and Practice: Rethinking Ring Around the Collar

- Andrew Rohm

For many, the most challenging aspect of teaching is to link theory (how things are supposed to work, or why things are supposed to happen), with practice (how things actually work in real-life) in the classroom. More directly, the challenge that we as teachers face is how do we enable our students to really understand and actively learn the theories and concepts put forth in textbooks.

When we are able to forge these linkages between the wealth of definitions, concepts, and research that our texts put forth and what the student actually experiences, something quite remarkable happens. Students suddenly understand and internalize subject matter that, too often, is left to mere words, overheads, or PowerPoint slides to explain. Role-play exercises that actively involve students can be an effective tool in greater comprehension of course material and can lead to greater understanding and internalization of difficult-to-grasp concepts.

My teaching philosophy that guides my approach to active learning and the use of role-plays in the classroom involves two principles: (1) active student engagement, and (2) student discovery.

First, my efforts to directly engage students with role-plays helps foster active discovery and learning inside as well as outside the classroom. In the book *The Courage to Teach* (Jossey-Bass, 1998), the author Parker J. Palmer talks about learning to dance and co-create with his students. Similarly, I believe my job is to help the students mix the ingredients that help define and communicate the subject matter and to engage them in the task of learning. Role-plays can help in this regard. Through role-plays, I engage the students by challenging them and taking risks, yet also by creating a classroom space with bounds, because there are frameworks and concepts that I am responsible for exploring in class.

Second, I believe the majority of learning

and discovery in my classroom takes place outside the assigned text. In my Consumer Behavior and Advertising Strategy courses, discovery may come from the actual field research the students conduct as they explore theory, or from the role-play exercises that allow them to think, analyze, trip over, confront, and actively learn concepts and themes and strategies covered in class



Role-plays make teaching fun and, based upon student feedback, can lead to greater learning and comprehension. I have adapted three role-play exercises that involve concepts or theories that are easy to present and discuss in class at a surface level, yet more difficult to really understand and apply to marketing strategy. These three role-plays and concepts they cover are: (1) family decision making, (2) the creation and diffusion of consumer culture, and (3) motivation.

For example, the motivation theory role-play involves re-staging the classic Wisk detergent commercial that was based on the theme of “ring around the collar.” Albeit outdated and perhaps insulting, this commercial was one of the most successful brand campaigns of its time in terms of its ability to appeal to underlying individual emotions. In this role-play, I ask for volunteers to play the role of husband and wife and waiter in a 5-star restaurant. The objective of the role-play is to bring to life how motivations are often communicated at a surface level (e.g., desire for clean clothes)—yet deeper motivations often lurk that are more difficult, if not embarrassing, for individuals to admit, and it is important for marketers to recognize and understand these underlying motives.

Student feedback regarding these and
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other role-play exercises leads me to believe that role-play works. Pre- and post-tests of my students' learning and understanding of concepts have helped to illustrate how effective active learning approaches involving role-plays can be. One student remarked that "...it really put us in the place of the consumer — whether it was what our character would want or our personal desires. Suddenly when you connected it to actual consumers it completely clicked. Out of nowhere I completely understood

the concepts that you were getting at."

So, why not think of ways that you can stimulate learning in your classroom using fun and effective active learning approaches involving role-plays? *

Andrew Rohm is a Professor in Marketing and a 2003 Excellence in Teaching Award winner.

Why Now is Better than Sometime Next Week: Homework as a Teaching Tool

- Jonathan Gwiazda

I choose to believe that homework should be assigned as an instrument for teaching. I think that the effectiveness homework assignments relies on 1) reasonable and relevant material, and 2) a clear and timely response. I learn best by doing and learn most powerfully from my mistakes rather than first time successes.

One of the best learning tools I have encountered at NU is the online "WebAssign" homework of Physics I, II, and III for Engineers. "WebAssign" is a homework program that provides the student five chances to answer questions from the text. Knowing immediately if you are right or wrong makes this program a powerful teaching tool. With "WebAssign" I could go back and correct myself while the question, and my erroneous approach for solving it, were fresh in my mind, rather than receiving a graded homework assignment a week or more later with red ink all over it. In this process I learned what was wrong with my own thought process, rather than trying to decipher what a graduate student (or faculty member) thought was wrong with my approach.

This style of homework assignment was the single most effective homework teaching tool I've ever experienced, and what made it so valuable was the instantaneous response time. It is harder to unlearn later

than it is to learn correctly the first time. In the case of homework assignments that cannot be encompassed in "right vs. wrong" format, I believe that the lesson from "WebAssign" is still valid: turnaround time is key in the effectiveness of homework learning.



Clarity is another necessity in effective homework learning. Students are confused enough by abstract topics such as Electromagnetics, Probability, and Fourier Analysis that brief, illegible responses don't provide much help. It is also a mistake to simply take points off without explanation.

I understand that many professors rely on graduate students to grade homework. In this case, I believe the professor should provide the grad student with a complete set solution of solutions that he/she has performed themselves. This way the professor will be aware of the ambiguities and difficulty level of the problems he/she is assigning. I also believe that the professor should grade one or two of the homework handed in by the undergrads so that the grad student can get an idea as to what the professor considers a fair grading format and to improve the grad students insight into appropriate homework commentary.

Solution sets should be done in a

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reasonably pedestrian fashion so that the students can follow the steps. Nota bene: Written clarity now will save you, the professor, multiple explanations during office hours later.

A piece of advice as a closing addendum - for professors teaching undergraduates - what students want to know is:

1. What is it?
2. Why is it important?
3. How do we use it?

Teach the fundamentals in a logical progression and with a sense of purpose and we will respect

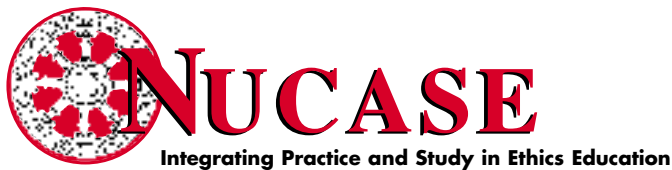
your efforts on our behalf. Above all remember ~ too much carrot, you get a lazy horse- too much stick, you get a stubborn horse.

Learning and Teaching is a circle, without beginning, middle, or end. Whether a teacher of students or a student of teaching, the roles are only defined by who is talking, who is listening, who is asking, and who is answering. I hope here that I have given back a little of that which I have gained. ✿

Jonathan Gwiazda is an undergraduate embarking on a mid-career change into Electrical Engineering.

AIR: A Teaching Tool for Thinking About How to Cultivate Ethical Inquiry

- Perrin Cohen, NUCASE



Recently, Donna Qualters, Melissa McDaniels and I led a NUCASE/CEUT workshop called "Infusing Ethical Inquiry into Semester Courses". As part of the workshop, we introduced NUCASE's AIR model of ethical inquiry as a teaching tool for cultivating and thinking about ethical inquiry. Since workshop participants found the model useful for organizing their thoughts and experiences and for thinking about how to infuse ethical inquiry into their teaching, I thought that a brief description of the model and its applications might be of broader interest.

The goal of the model is to help students make wiser choices through enhancing awareness of ethical concerns that they experience and through clarification and refinement of their ethical thinking, decision-making, and responding to such concerns. The acronym AIR refers to the elements of inquiry: Awareness of ethical issues, Investigation of those issues, and Responding to those issues. It is noteworthy that a student recently thought that AIR was also an appropriate

metaphor because, for him, the experience of ethical inquiry was like "coming up for air"! We find that most students have a similar experience. Engaging in the process is both useful and refreshing.

Pedagogically, there are several conditions needed to help students feel more comfortable to engage in reflective ethical inquiry. First, there needs to be an understanding among students and teacher that in raising and discussing ethical concerns, the spirit and goal of the conversation is only to help one another to clarify and refine one's own ethical awareness and thinking. The point is not to be "right", to put some one else "down", to impose one's thoughts on another, or to judge other's thoughts. This helps to move students from a "reactive" to a "thoughtfully reflective" mode. Most students enjoy this. Secondly, before having a reflective conversation of this nature, it is useful to clarify that the conversations are only for the purposes of inquiry and the details are to remain confidential. Regardless of whether it is a 15 minute discussion or a semester long class, these "ground rules" put students at ease and support ethical reflection and inquiry.

It is important to keep in mind that the AIR model is a framework for thinking about the process of ethical inquiry. It is a framework that can be adapted in part or in toto, depending on the

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teacher's goals and interests. For example, I have used all three elements (A, I & R) in teaching both an undergraduate senior seminar "Ethics in Psychology" and a graduate seminar "Research Ethics". In the first part of the course, students engage in "A", reflective discussions about ethical concerns that they have either experienced (e.g., lab, classroom, work, student activities) or that have been on their mind (e.g., stem cell research). In this initial phase, students learn to identify and acknowledge core ethical issues (e.g., fairness, honesty, care, compassion) and to distinguish them from near cousins (e.g., legal & psychological issues). The gray areas, of course, also become evident. Having identified an ethical issue, students engage in "I" or reflective, interdisciplinary research to clarify and refine their thinking and decision making about it. They use a variety of resources and tools such as psychological research/theory, stakeholder theory, normative ethics (e.g. guidelines, codes), ethical theory (e.g., utilitarian), historical analysis, wisdom teachings (e.g., spiritual, religious), literature, etc. The NUCASE webpage(www.nucase.neu.edu) can provide a starting place for such investigation. Having clarified and refined their thinking and decision making, students next engage in "R" or responding by exploring how they might creatively bring their thinking and decision making into the real world (e.g., self care, innovation, advocacy, career change).

Sometimes I have just used the "A" element. For example, if I am a guest lecturer or asked to do a one hour workshop, I likely would use it as an opportunity for students to identify and acknowledge ethical concerns and issues that they have experienced in their discipline (classes, labs), residential halls, work, etc. This reflective inquiry is something that students usually have little or no opportunities to do and are sometimes discouraged from doing so. Students are quite appreciative of the opportunity and benefit from listening to themselves and other students. This can be a good start for further inquiry.

In a workplace setting, co-op and academic faculty use the AIR model in a different way. They focus on the "A" element with a little introduction to "I" in teaching. One example is NUCASE's one credit, "Ethical Awareness Course on Co-op"

course. Students take this course while they are on co-op. Focusing on the "A" element helps students be more reflectively aware, sensitized, and conversant about ethical concerns that they experience in the workplace and benefit from listening to others' experiences and thoughts. As part of the course, students do a short capstone research project that introduces them to the "I" element. For example, students might explore ethical guidelines related to their workplace discipline (e.g., business ethics) or find out how their employer deals with a particular ethical issue.

In the School of Education, Donna Qualters uses the AIR model in yet a different way. She uses it to help student teachers think more deeply about ethical issues that they encounter in real life teaching situations. In her "student teaching" seminar, Donna introduces the AIR model to help students process the ethical underpinnings of difficult political and cultural challenges that new teachers can face. She devises common case study situations in which the students might find themselves. For example, there is a case on gossip in the teacher's room, one on perceived sexual harassment, and another on writing a reference letter. In that seminar, students are asked to identify and acknowledge the underlying ethical issue(s), the "A" element, to investigate how they might clarify their thinking and decision making about that issue, the "I" element, and to consider practical options and choices for bringing their thinking and decision making into the classrooms, the "R" element. The discussion that evolves from these cases provides students not only with a framework to view future ethical situations, but also refines their thinking, and generates resources and tools for their future practice.

These are only a few examples of the ways that the AIR model can be used. If you would like more information about how to apply the model to your teaching situation, please contact me (p.cohen@neu.edu), check the NUCASE webpage (www.nucase.neu.edu) or contact CEUT (www.ceut.neu.edu) about upcoming NUCASE workshops for faculty and TA's. ❁

Perrin Cohen is the Director of NUCASE.

Chalk Talk

by Jonas Chalk

The purpose of the Jonas Chalk "Chalk Talk" column is to initiate a dialogue on best practices, successes, and frustrations in teaching. (Although the concerns covered are often universal, we do put a particular emphasis on the challenges and rewards of teaching freshmen.) This column hopes to stimulate, engage and occasionally nudge professors to share their wisdom and ideas about the best ways to achieve outstanding learning outcomes in. Readers can submit letters, questions, or ideas that you have to jchalk@coe.neu.edu.

Old Jonas columns can be accessed at: <http://gemasterteachers.neu.edu/documents/documents.html>

Dear Jonas,

I am teaching an introductory class, and some of my students asked if they could work on their assignments together. They said that they had worked in pairs in another engineering class, and felt that it worked well, so they wondered if they could do it again. They told me that they handed in one homework assignment for two people. I have always encouraged them to form study groups and help each other, but insisted they submit individual work. Have you encountered this approach before?

Signed,
Paired What?



Dear Paired,

The students may have been referring to a technique called "Pair Programming," which is used in some programming courses in the College Of Engineering. Pair Programming involves students working as a team of two on specifically designated aspects of the same design, algorithm, computer code, or assignment. The primary objective of using Pair Programming is to reduce students' frustration when programming for the first time and to increase the likelihood that they will continue attempts to understand the nuances of computer programming more easily than when working alone. This type of partnership may be extended to other types of assignments, but requires that the students assume very specific roles.

Pair Programming is not merely an exercise in dividing up required work on a coding project. For each assignment each member of the pair has an explicitly defined role of being either driver or navigator. The driver has control of the pencil, mouse, or keyboard and writes the code. The navigator continuously and actively monitors the work of the driver, watching for defects, thinking of alternatives, looking up resources, and considering strategic implications of the work. The team members work under these specific guidelines and are instructed to cooperate on the entire

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assignment together, rather than dividing it up and integrating the parts later. They are also expected to schedule time together for the purpose of completing their joint work. Partners are required to trade roles for each new assignment. All students must participate in Pair Programming for at least one assignment. Quizzes and tests are taken individually, so the students are still accountable for learning the material in the course.

Assessment done by faculty using Pair Programming found that it inspired confidence in the students, specifically in their ability to achieve the task at hand. Team members reported that they benefited from exposure to their partner's ideas and suggestions, and that they achieved a broader understanding of the requirements for assignments. Students indicated that it was easier and quicker to complete their work and expressed an overwhelming belief that it helped them identify errors more readily and consider alternative approaches to problem solving. Correlation of student grades with their reported time logs supports student accounts of their experiences. A typical comment from a student who participated in Pair Programming follows:

"Without the roles that we were working in, finishing this assignment would have been much more difficult. Instead of working with one person's ideas, we used two sets of ideas, and pooled them together in order to produce an answer to the assignment."

From an administrative perspective, Pair Programming enables more efficient use of the university's facilities and resources, since fewer workstations are required. The instructors' time is also better utilized, since the number of potential inquiries is reduced, and the quality of inquiries is improved. Two experienced professors, who have employed Pair Programming techniques, noted that the tone of the lab environment was distinctly more collegial and less stressful than in courses where students worked individually. Students conveyed a higher perceived level of satisfaction in courses and with projects that make use of Pair Programming. Higher levels of learning are achieved, because partners can more readily solve minor problems, such as syntax errors, and move on to more complex issues. Homework grades were higher for Pair Programming participants. In addition, students reportedly gave up less often and were likely to submit more complete projects than when working alone. These benefits resulted from strict adherence to explicit roles.

Successful implementation of Pair Programming does require a level of diligent administration. To ensure that students maintain their roles, they are required to submit time logs and report percentages of work done individually on each assignment. Some students do find it difficult to meet with classmates outside of class, and therefore the instructor cannot be guaranteed that the teams are following the guidelines. Faculty work with the students to ensure adherence to the guidelines, and feedback on Pair Programming is solicited frequently to assess the implementation.

When working as Pair Programmers, students performed just as well in the course, learned as much programming and achieved good scores on tests and quizzes, but were considerably less frustrated; they related that they actually enjoyed programming. The fostering of student learning through pairing is likely to enhance student learning in other venues as well.

Jonas and Partner

Do you want to improve your class during the semester?



**REGISTER NOW FOR
Student Mid-Term Course Feedback
Small Group Instructional Diagnosis (SGID)**

- a confidential method that uses small group discussion among students to provide feedback to an instructor for improving teaching and learning, providing suggestions for strengthening the course, and increasing communication between students and teacher.
- this discussion with students is conducted by trained professionals during 30 minutes of regular class time while the instructor excuses her/himself from the room. These sessions will be conducted during the first 3 weeks of October. The resulting report is returned to faculty in a confidential, individual meeting during the following weeks.

For more information, see our website at:

<http://www.ceut.neu.edu/sgid.htm>

**Space is limited! Register by September 18 by e-mailing
Cynthia at C.Sanders@neu.edu**

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