NUTSHELL NOTES

"Teaching tips in a nutshell" — The One-Page Newsletter for Teaching Excellence

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Volume 1 Number 1 August, 1992

A New Newsletter — A New Center!

Greetings and welcome back to campus! "*Nutshell Notes*" began at the University of Wisconsin at Platteville in fall of 1991. Like most faculty elsewhere, we professors there had little passion for reading extra documents that took time away from our classes and research. However a one-page newsletter that focused on practical teaching tips and that could be read even on the way to class soon became appreciated and brought good comments from many faculty. *Nutshell Notes* is new to our campus and is the first service that you will receive from the Office of Teaching Effectiveness.

Also new to this campus is me, Edward Nuhfer (pronounced "new fur"), your new director of the above office, and I feel honored to be serving you in this capacity. I first encountered an office like this in Boulder while on sabbatical from Wisconsin. What their office did for faculty made so much sense that I authored a grant to start a teaching excellence center on my own campus in Platteville. The center flourished to the point that the demands on it (and me!) soon went far beyond the 25% release time that was provided. Platteville was a fine place in which to work and live, but when the opportunity to do this work full-time was offered in Colorado, I couldn't resist. Colorado was too beautiful, Denver too exciting, and the campus too rich in opportunities to think of passing up the chance to be part of it. My wife, Mary, and I are thrilled to be here!

What does an "Office of Teaching Effectiveness" do? The collective term that describes the general functions of offices like ours is "faculty development." A good way to start to think of such centers is as the analogues to the weight training rooms of professional athletes. Professionals go there to become stronger and more capable of doing a very difficult and demanding job. Like athletes, teachers engage in an enterprise in which there is no such thing as perfection. There is no teaching so good that it cannot be improved. In short these centers exist to help faculty succeed well in their teaching. Help is provided in a variety of ways. Typically, faculty development centers offer and sponsor workshops, provide resources, offer consultation and serve as advocates for good teaching. Faculty development centers are <u>not</u> in the business of judging faculty or entering into the evaluation of individuals for purposes such as salary, tenure or rank. A faculty member approaching a development center for help has every right to expect that help, as well as encouragement and full confidentiality.

The "molecule" above models the "big picture" of a faculty development center within a university. Three basal spheres (administration, faculty and students) should pull together to support a teaching and learning community larger than all three groups combined. The faculty development center (the small dark "atom" above) should help to promote cohesion within and between the basal spheres without being obtrusive. Strong cohesion between these spheres results in a wonderful university in which to be an employee or a student.

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Volume 1 Number 2 August, 1992; revised August, 1994

BUILDING A BETTER SYLLABUS

Drafting a good syllabus for your course can help your students gain a smooth entry into their semester and can prevent a number of frustrating events for you at a later date. The shortcomings of any syllabus most likely will show up in the final weeks of the semester when students and professors are harried, and misunderstandings become trying for all concerned. The pointers given here are not intended to dictate to you how your syllabus should be done. Instead the list allows you access to what has been discovered about syllabi. Most grading complaints that result in serious damage to professors and their institutions can be traced back to badly constructed syllabi.

WHAT IS A "GOOD" SYLLABUS?

Some authorities state that a syllabus is "a contract with students," but those who encourage writing of syllabi as though they were closed contracts (*i.e.* a rigid schedule that guarantees what will be covered on a given date) may dupe professors into causing serious problems for themselves. Many courses are not suited to being taught under a rigid schedule. This is particularly true for teachers who use active-learning strategies instead of relying only on lectures. According to W. J. McKeachie, the answer to "How complete, detailed and precise should your schedule be?" is "Not very." This is because circumstances arise that make it advisable to depart from a rigid schedule, and there is no advantage to committing yourself to a course of action that you will later regard as second-best. Students themselves are the most important variable in a course plan, and your own schedule should be sufficiently flexible to take advantage of students' awareness and interests. One of James Eison's "Ten Maxims for New Teachers" is extremely important to reflect upon during preparation of syllabi: "**Teach less, better**." Research shows that little factual detail is retained a few months after a class, so what will be most valuable to students will be that which provides long-term retention. Albert Einstein once said that "Education is what remains when one has forgotten everything learned in school." Planning your syllabus around the major concepts that you want your students to understand is more likely to yield satisfying results than a schedule based upon page numbers and topics.

Syllabi Checklist

A "GOOD SYLLABUS" will probably provide the following. Check your own regarding these points.

- ☐ *Textbook and/or outside materials needed*
- ☐ *Your office number and office hours*
- ☐ *Grading scale*
- ☐ *Type of knowledge and abilities tested during exams*
- ☐ *Pre-requisite courses or skills*
- ☐ *Why your students should want to take your course*
- ☐ *What parts of the overall discipline are represented by this course*
- ☐ *How the course relates to the primary concepts and principles of the overall discipline*
- ☐ *The objectives of the course*
- ☐ *Why the objectives are important*
- ☐ *How the student will be better for having taken the course*
- ☐ *Why the course is organized in a particular sequence*
- ☐ *If the course will be primarily lectures, discussions or group work*
- ☐ *How the knowledge will be acquired by the student*
- ☐ *Call to be made aware of students' special needs*
- ☐ *List of required readings (insofar as known)*
- ☐ *Policy for missed tests*
- ☐ *Policy for late work*
- ☐ *Policy for absences*
- ☐ *Policy for extra credit work*
- ☐ *Instructional technology requisites*

Abbreviated References: Eison, J., 1990, "Confidence in the Classroom, Ten Maxims for New Teachers," *College Teaching*, v. 38; Roepke, J., 1991, *Enhancing Teaching Effectiveness*, Ball State Univ.; McKeachie, W. J., *Teaching Tips*, (8th ed.,) Heath; and Rubin, S., 1987, "Professors, Students and the Syllabus," *Chronicle of Higher Education*.. Altman, H. B., and Cashin, W. E., 1992, "Writing a Syllabus," KS State University *IDEA Paper* n. 27.

Boot Camp folks note: All of UCD's Nutshell Notes can be accessed through http://www.cudenver.edu/public/OTE/nn/index.htm

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Volume 1 Number 3 September, 1992

Make a CLASS DIRECTORY with GROUPS

Study Teams Help Students and You

A number of universities have now documented that students who study together in teams usually outperform those who try to study solo, especially in a difficult course. The ability to focus on a task through using interpersonal skills and teamwork also ranks very high in the list of skills which employers want today. "Cooperative Learning," a highly sophisticated method of teaching that relies more on classroom management skills than lecture oratory skills, has been developed over a period of about 25 years by the Johnson brothers at the University of Minnesota. Their methods develop teamwork, and the Johnsons summarize the concept with an often-repeated statement: "We sink or swim together." Making a directory helps students form study groups.

Even if you have not been trained in cooperative learning techniques, you will find that students who study together for your course have an advantage, and even if you never make group assignments, you will be doing your students a favor if you help them to organize their own study groups. This is particularly true at a commuter campus like CU - Denver. The presence of computers with spreadsheets in faculty offices makes creating a class directory and forming teams a snap. Outcome is worth the effort.

Pass out 3 x 5 note cards early in the term and ask the students to print their full name, telephone number, and home zip code. Collect these and type them into your spreadsheet in columns as shown below.

FULL NAME	LAST NAME	PHONE NUMBER	ZIP	GROUP NUMBER
FULL NAME	LAST NAME	PHONE NUMBER	ZIP	GROUP NUMBER

Save this file. Then, use the "SORT" option in your program and arrange the whole file by zip code. This allows a reasonable chance of putting students together in groups from the same area of the city. Then assign group numbers starting with "1," making groups the size you wish (5 students is usually good). Once completed, save the file again under a new name (for backup safety) and then SORT it again alphabetically by last name. Then print out three columns of your spreadsheet: *Full Name, Phone Number* and *Group Number*. Reproduce the list for the class. If possible, give your class 5 or 10 minutes at the end to gather and meet their group partners. If students want to trade groups, allow this, but mandate that they give you in writing their name and new group number. Be sure no one is left alone as result of shifting.

How does this help students? They now have a directory of their class, and they can call one another for help. If they are new to campus, you've just given them the opportunity to make 4 friends. If you harp a bit on the benefits of group study, they might even consider how helpful study groups can be to them.

How does this help you? For one, you now have a complete spreadsheet set up with which to do your grades for the rest of the term. You can announce to the class that if a student misses a lecture, that they can call one of their group for the notes; if they know they are going to miss a class, then they should contact a group member to pick up any handouts, notes or assignments. This keeps you from being placed on a hundred students' schedules, and allows you to focus on giving the kind of help to individuals which they cannot easily get from student peers. If you do assign group work, you've just set up your groups with a few strokes on the keyboard.

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Volume 1 Number 4 September, 1992

AVOIDING THE "PROFESSOR WHO IS NOT AVAILABLE" REPUTATION

Receiving marginal ratings on student evaluation questions that relate to helping students is frustrating. Frustration occurs because professors usually feel that they really were available to their students and never refused help to anyone during the term. Suddenly, these same faculty, perhaps after keeping long office hours, find that they are receiving less than sterling ratings in this area. Some may even be under fire from supervisors as a result. Most times the problem does not result from a professor intentionally neglecting his or her duties.

Part of the problem lies in the fact that students are not instructed about evaluations. Typical generic survey statements that lead to the above problem would be "On a scale from 1 (not at all descriptive) to 5 (very descriptive) rate the professor in: (A) Is accessible to students outside of class and (B) Gives personal help to students having difficulty in the course." These usually appear in a long list of "1 to 5" queries such as "Uses examples and illustrations," which every individual who has attended the class should be able to rate. The former two queries, however, can only be answered with validity by those students who have actually approached the professor for help outside of class, and this often, unfortunately, is a very small part of the class. The entire class, however, is prone to answer all queries anyway, and many will likely circle the "3" (somewhat descriptive) in ambivalent response to a question which doesn't excite them very much. A "3" of course will not be seen as ambivalence by reviewers; they may see the "3" as meaning that half the students who needed help didn't get it! Thus when evaluation forms are passed out, students should be cautioned about this problem and the need to collect solid data rather than expressions of current feelings. Students especially need to be cautioned to leave queries blank that ask them to evaluate a trait with which they do not have first-hand experience.

The other part of the problem lies in those students who really do come to your office outside posted hours and find that you are not there. You won't know this is a problem, perhaps, until one writes a nasty comment on your evaluation. One of the best safeguards against this is a ruled pad with a pencil on a string attached to the outside of your office door. Above the pad is a permanent sign:

"Are you looking for me and not finding me? If so, leave your name, date and time and your phone number. I will call you."

On the pad are three vertical columns for name, date & time, and phone number. When you have contacted the student (DO IT as soon as possible!) and filled his or her need, cross the name off the paper. I have used this method over the past 5 years, and there has not been a student who signed that pad who didn't receive the desired help. Save the sheets from the pad as they fill up over the course of a semester. Once this procedure is in place, a supervisor must accept the facts concerning your helping students because you now have this as written record. It is a good idea to explain the function of the paper pad to your students on their syllabus too. When they know that you encourage visits *and* keep a record of who comes for help, more will be inclined to get needed assistance.

ADDENDUM: In the last issue of *Nutshell Notes*, a method for establishing a class directory and forming study groups was provided. This included producing a list of student phone numbers so class members could contact one another. A reader informed me of the potential problem from circulating an unlisted phone number. His point is well taken and I am following his suggestion to elaborate on this a bit more. My elaboration: *When you collect data, always be up front with your students about what you are going to do with it. Respect the wishes of anyone who doesn't want to be contacted by classmates, and allow his or her phone to remain unlisted.*

Also, once placed in groups, some students may choose not to make use of them while others will make use of the opportunity you have provided. The important part of the directory is that it provides opportunities. All *Nutshell Notes* are suggestions, not assignments. Enjoy the newsletter and select those things which you see as useful.

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Volume 1 Number 5 October, 1992

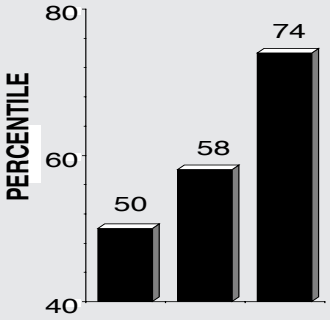
Navigating Your Way Through the Woods

Sweating, swearing, and swatting deer flies on a steaming, hot afternoon in the Appalachians, we had been hacking our way through shoulder-high poison ivy for over an hour, each of us glancing with concern at our watches to estimate our dwindling reserve of daylight. We listened for any hint of traffic from a road that we suspected, and surely prayed, was just ahead. We were also mortified — geology and engineering students who should have known better — lost in the woods! We were also in the midst of learning one of a field student's more humiliating lessons: maps aren't a tool you can use to find your location after you are lost. Instead, maps are used to chart your progress from the start, so that the issue of becoming lost simply does not arise.

The same principle holds true in surveying our students' perceptions of our classes. Most of us typically won't know we've lost a contingent of our students until we give that end-of-term evaluation, when some of us then discover to our chagrin that there were more hurtin' puppies in our classes than we suspected. Waiting until the end of the course to learn how well students' needs are being met is like waiting until you're lost to consult a map. At this stage, if damage has been done, there is no opportunity to alter your script to insure a happy ending. If however, you give a *well-designed* evaluation to check the pulse on your course **early**, you can then make needed changes, and you can prevent your final evaluations from taking that unintended turn toward an end-of-term ambush.

What is a *"well-designed"* evaluation tool? Primarily one which helps you target areas in which your effort will yield worthwhile improvements. This office provides a 40 - point diagnostic questionnaire developed from several years of research and use in Wisconsin, California and mainly in our own Colorado system. It is computer-scored, takes a very short time to give and is designed to help you, not to judge you or rank you competitively against peers. The results go to you alone. Follow-up consultation, which is completely confidential, is also available through this office. In order to schedule this diagnosis of your own class, simply send your name, your class size, the room where it meets and the date you'd like the survey given to the following campus address: Edward Nuhfer, Director - Office of Teaching Effectiveness, Campus Box 137; or phone me at 556-4915.

The value of giving a mid-term evaluation was shown by Cohen (1980, Research in Higher Ed., v. 13, pp. 321 - 341), who noted that those who gave no mid-term evaluations were likely to have final student evaluation ratings at about the middle of the pack (50th percentile - see graph below); those who merely gave a mid-term evaluation and used the results climbed to the 58th percentile. Those who gave a mid-term evaluation and used consultation with another person to help define effective ways to improve were likely to end up in the 74th percentile. That is quite a difference, and indicates that results can come from some enlightened effort.



Likely percentiles for final average student ratings after actions (or inaction) taken at mid-term. Consultation, based on results from a mid-term survey, will likely improve the satisfaction that you and your students obtain from a course.

Consider using this free service while it can do the most for this term's course. It's no fun to be "lost in the woods!"

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Volume 1 Number 6 October, 1992

The "One - Minute Paper" — Making Good Use of the Final Minute of Class

The final minutes of class can be frustrating if students begin glancing at watches and stuffing notebooks into bags before class time ends. These same minutes, however, can be structured to retain student involvement and a high level of interest.

One final query that provides outstanding benefits has become known as the "**One Minute Paper**." The actual originator of the idea remains unidentified. Some say that the exercise began in Berkeley as a professor's initiative in taking attendance, and that the benefits only came to light as the students responded. Others attribute the origins to the work of Patricia Cross and Thomas Angelo on classroom research that was published through the University of Michigan. Regardless, the idea has proven its worth in many classrooms.

This is an ungraded exercise and the query is simple — before the end of class, ask two questions.

1) What do you view as the most important thing that you learned today in this class?

2) What is the foremost question (concern) in your mind about today's material?

Students respond in writing for one minute and pass in their answers. It doesn't take long to see the benefits of students devoting the final minute of class to this. The answers reveal the degree to which students are truly identifying and understanding the central concepts of your topic. It also helps students to process what they have just learned before they break their trend of thought with another class. If students know that they are going to have to have to provide a thoughtful response, they have more incentive to pay attention and to ask questions.

Some professors find that the responses serve as a useful basis for starting the next class meeting with review and continuity. Others find that they can respond in writing to some queries and establish one-to-one dialog that might otherwise not exist in large classes. Reading students' responses does take some time, but not very much. Odds are good that the results will prove to be worth that time.

Be sure to structure your queries so that class does indeed end on schedule.

A BIG THANK YOU!

I want to thank all of the CU - Denver faculty for your kindness in making my initial two months at this campus so very wonderful. Your numerous telephone calls saying "Welcome to Denver!" were an unexpected surprise, and your thoughtfulness is truly appreciated.

I have been very impressed by how ready this campus has been for this Office of Teaching Effectiveness. Much credit must go to last year's teaching committee who laid plans for this office and kept everyone informed or involved. The invitations for class visits and diagnostic surveys have been far beyond what normally occurs on any campus during the first year that it has a faculty development center. I have learned quickly that the faculty and staff are very dedicated to teaching and to serving their students. This is a good place to be, and it is a great honor and pleasure to serve you.

Sincerely,
Ed Nuhfer - Director

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Volume 1 Number 7 November, 1992

MORE ABOUT DIAGNOSTIC SURVEYS and CONSULTATION

Last month (Vol. 1, No. 5) we encouraged use of a 40 - point diagnostic questionnaire for a mid-term student evaluation. In this issue, readers who haven't seen this diagnosis first-hand will get to learn more about its nature and its benefits. Formative surveys like this help faculty to help themselves. The 40 - point survey we provide is designed to allow a faculty member (1) to assess how students are perceiving the class and (2) to discover specific areas of teaching where attention and changes are likely to yield the maximum benefits.

When given at UCD, results from the class survey are presented in graphical form. The display portrays six areas (Figure 1) that much research has verified as important to teaching. All six areas are related. These areas are profiled by 40 traits judged as especially helpful from the *students'* point of view. Responses range from (1) low to (5) highest. Clusters of responses (areas) are as important as responses to any of the individual 40 questions. The profile allows one to quickly identify an area to concentrate upon. At this point, consultation becomes invaluable. The instructor selects the area of focus, and the consultant helps by clarifying relationships and by supplying techniques, resources and tools.

A long-term benefit comes from allowing the students to keep their copies of the 40 questions. In order to have successful student evaluations of any kind, the student body must first be educated about traits that are helpful to their learning. Thanks to faculty response last month, over 1500 UCD students read, used, and now own one of the 40 - point forms. They further have learned, in the few minutes of explanation that precede the survey, about pitfalls that accompany even the best of paper surveys.

One of the most powerful complements to the 40 - point survey is **in-class videotaping** of a lecture. The first UCD faculty member has already successfully used videotaping in conjunction with the survey and consultation. If you could spare only two hours in your entire life for improving your teaching, the way to spend it would be in viewing, with a trained consultant, a tape of your own lecture with the results of your survey in-hand. This office can arrange to have a videotape made of your class at no cost to you, so you can have that superbly productive two-hour experience.

Should you desire the benefits of an in-class videotaping, an in-class survey, or both, ***there is no time like the present***. Phone Edward Nuhfer at 556 - 4915 to make arrangements.

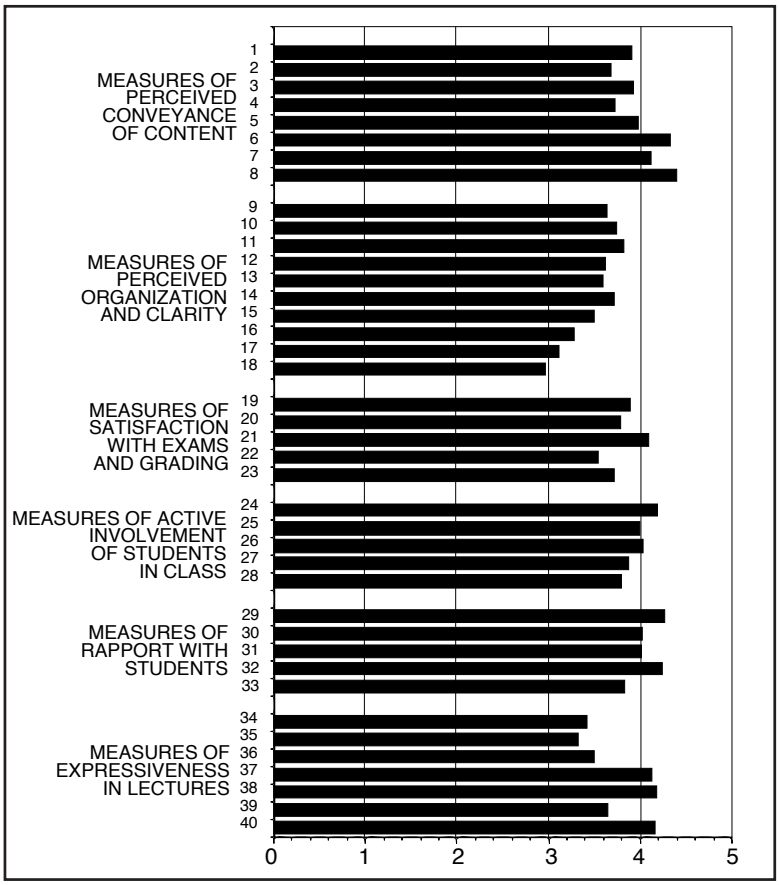

Figure 1. This graphical display of results from this 40-point survey reveals a successful teaching style with high marks in all six areas. Further improvement may come from an emphasis on organization and clarity. Profile shows more of a tendency toward interactive teaching than dazzling lectures. Any plan to improve should capitalize on the instructor's preferences and strengths.

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Volume 1 Number 8 November, 1992

Seven Principles for Good Practice in Undergraduate Education

Condensed from Arthur W. Chickering and Zelda F. Gamson, 1987, *Wingspread*, v. 9, pp. 1-8.

1. Good Practice Encourages Student - Faculty Contact.

Frequent student - faculty contact in and out of classes is the most important factor in student motivation and involvement. Faculty concern helps students get through rough times and keep on working. Knowing a few faculty members well enhances students' intellectual commitment and encourages them to think about their own values and future plans.

2. Good Practice Encourages Cooperation Among Students.

Learning is enhanced when it is more like a team effort than a solo race. Good learning, like good work, is collaborative and social, not competitive and isolated. Working with others often increases involvement in learning. Sharing one's own ideas and responding to others' reactions improves thinking and deepens understanding.

3. Good Practice Encourages Active Learning.

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

4. Good Practice Gives Prompt Feedback.

Knowing what you know and don't know focuses learning. Students need appropriate feedback on performance to benefit from courses. In getting started, students need help in assessing existing knowledge and competence. In classes, students need frequent opportunities to perform and receive suggestions for improvement. At various points during college, and at the end, students need chances to reflect on what they have learned, what they still need to know, and how to assess themselves.

5. Good Practice Emphasizes Time on Task.

Time plus energy equals learning. There is no substitute for time on task. Learning to use one's time well is critical for students and professionals alike. Students need help in learning effective time management. Allocating realistic amounts of time means effective learning for students and effective teaching for faculty. How an institution defines time expectations for students, faculty, administrators, and other professional staff can establish the basis for high performance for all.

6. Good Practice Communicates High Expectations.

Expect more and you will get it. High expectations are important for everyone - for the poorly prepared, for those unwilling to exert themselves, and for the bright and well motivated. Expecting students to perform well becomes a self - fulfilling prophecy where teachers and institutions hold high expectations of themselves and make extra efforts.

7. Good Practice Respects Diverse Talents and Ways of Learning.

There are many roads to learning. People bring different talents and styles of learning to college. Brilliant students in the seminar room may be all thumbs in the lab or art studio. On the other hand, students rich in hands - on experience may not relate so well to theory. Students need the opportunity to show their talents and learn in those ways that work for them. This develops the self-confidence that encourages students to further explore learning in new ways that may at first seem difficult to them.

The "Seven Principles" were compiled in a study supported by the American Association of Higher Education, the Education Commission of the States, and the Johnson Foundation.

CU - Denver's *Nutshell Notes* are available in alternative formats upon request. Call 556 - 4915.

NUTSHELL NOTES

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Volume 1 Number 9 December, 1992

COOPERATIVE LEARNING (1)

In most classroom learning situations we retain about 30% of what we hear and about 50% of what we see, but nearly 90% of what we teach. On that basis, it appears that one of the most effective ways to increase our students' knowledge would be to manage our classes so that students actively engage in learning by teaching one another. **Cooperative learning** is a classroom management approach that permits this kind of learning-through-teaching to take place. Over 350 studies show that students learn more, develop higher order thinking skills, and develop superior social skills when taught through the cooperative learning model.

To contrast cooperative learning with the conventional lecture approach, let's look at two ways to engage the class with a question. In the traditional lecture mode, which most of us learned through example, one might ask a question, then pause to carefully hear the answer presented as students respond. We might then take any good opportunity at this point to encourage our students by giving praise and credit for good answers, and to clarify, expand, or engage in more discussion on the material. The cooperative learning model, however, looks a bit more critically at what is happening aside from this good teaching practice. It takes note of the fact that the questions are probably answered by just a few better students, and that most of the class is not **actively** engaged. Indeed, in most classes, *90% of the discussion is done by less than 10% of the students!*

An alternative approach — using the same question to engage the **entire** class — is the cooperative learning technique called **"THINK-PAIR-SHARE."** In this latter approach, one poses the question or problem, perhaps in writing on an overhead or the blackboard. Instead of allowing the most active students to answer the question, one states *"Turn to your nearest neighbor and consider this question between you. You have two minutes for the two of you to arrive at your best answer and an additional thirty seconds to outline it in writing."* Next, one calls at random on several pairs of students. If some pairs have conflicting or alternative solutions, this is the best possible result, because the class (as pairs) must now consider the **process** used to arrive at a good solution. Using student-pair responses, the instructor helps to track and organize the process on the board. All the student pairs must agree that the logic which the class finally produces on the board is a reasonable one that will lead to a successful solution. A final "sharing" could occur if the instructor told the students: *"OK! Now go back into your pairs; each member gets one minute of the following two minutes to teach the other member how to approach and solve this kind of problem."* At that point the entire class has been engaged in thinking, reviewing, generalizing, and processing by teaching.

THINK-PAIR-SHARE is one of the simplest of all cooperative learning techniques. Even in a traditional lecture setting, this technique is one of the best ways to turn an unresponsive "stonewalling" class into a responsive class that is alive, engaged and inquisitive.

To learn cooperative learning is similar to learning to ski; one must start gradually and build to more complex challenges. It also involves educating students in how to approach learning in a cooperative way.

If you want to learn cooperative learning techniques, have we got a deal for you! **Mark February 22, 1993, on your calendar.** This office is bringing in Karl Smith, one of the true gurus on the method from the University of Minnesota's Center for Cooperative Learning to do a one-day workshop for UCD faculty. Is it worth cancelling one day of class from your syllabus? You bet!! See next issue for more details.

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Volume 1 Number 10 December, 1992

COOPERATIVE LEARNING (2)

YES! It is the holiday season, and arriving very quickly too! It is a time for gifts and giving, and the **cooperative learning workshop with Karl Smith slated for Monday, February 22, 1993,** is probably one of the nicest gifts that we could provide for ourselves as faculty.

Most of us have one primary teaching tool — the traditional lecture method. It is our only tool because it is the only teaching-learning mode that many of us ever experienced. This will be a chance to add an entirely new tool to our repertoires. It is a tool which has been proven as highly effective through examining results critically in hundreds of published research studies. The workers at University of Minnesota's Center for Cooperative Learning, led primarily by David and Roger Johnson, have developed cooperative learning over the past 27 years. Their research focused on primary and secondary schools, but it has been so successful in these pre-college classes that it is unavoidably headed for university teaching in a big way. In 1991, the first text prepared for university teachers, *Active Learning, Cooperation in the College Classroom*, was released by Interaction Press. The authors were the Johnson brothers and Karl Smith, our workshop instructor.

In addition to his graduate degrees and reputation in education, Karl is a professor in the University of Minnesota's College of Engineering. Karl is a pragmatist, and he uses cooperative learning techniques extensively to teach courses known to cover difficult content. These courses include mathematical modeling and thermodynamics. Karl provides an excellent workshop that introduces effective strategies that can be employed by instructors in any field.

The six-hour workshop will probably be held at St. Cajetans (firmer details later) and will include a catered lunch. Those who register for the workshop will receive their own copy of *Active Learning, Cooperation in the College Classroom* at the workshop. (YES - this is the Christmas season!) The only thing you will have to do to attend is to get your name to Ed Nuhfer through UCD Campus Box 137, or phone it in at 556-4915 by **JANUARY 27.** (The secretary or work-study student will record all names received by phone.) The deadline is **firm** and is needed to allow us to procure all materials and make final arrangements. I wish we had space for everyone, but as you know space is limited and keeps us to under 160. Thus the first 160 responses are **it**.

In volume 1 number 8, you received Wingspread's **"Seven Principles for Good Practice in Undergraduate Education."** If you looked at them closely, you probably noticed that these were much different from what is often measured on "teaching evaluation" forms. The "Seven Principles" are student - centered rather than teacher - centered, and the seven principles capture the major emphases of cooperative learning. Our newsletters leading to the workshop will continue to introduce cooperative learning so that readers will approach the workshop with familiarity.

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Volume 2 Number 1 January, 1993

COOPERATIVE LEARNING 3—The 5 Basic Elements

Cooperative learning is much more than simply having students work in groups. Professors who try group work without building in the primary elements of cooperative learning usually have experiences that range somewhere between disappointment and catastrophe. Common complaints with group work are

1. students in the group having conversations that have nothing to do with the lesson or the class;
2. students becoming impatient with others in the group and ceasing to work cooperatively;
3. one bright student doing most of the work and the others putting their names on it.

These activities do not occur during true cooperative learning. True cooperative learning has 5 elements* that prevent such problems.

1. POSITIVE INTERDEPENDENCE – The task must be structured so that members of the group sink or swim together; one member cannot succeed at the expense of others.

2. FACE to FACE INTERACTION – This exists when students assist and support one another's efforts to learn. This occurs as students actively teach one another to solve problems and understand concepts.

3. INDIVIDUAL ACCOUNTABILITY – This prevents a member from getting a free ride on the work of others and prevents low quality of work being accepted from an individual by peers in the group.

4. SOCIAL SKILLS – Groups improve as members learn to contribute positively, acquire trust and manage conflict. These skills are not innate; they must be learned by the teacher and taught to the students.

5. GROUP PROCESSING – Processing time is usually the most neglected aspect of classroom teaching. In an effort to "cover the material" we forget that our objective is students' learning, not just presenting material. Processing is essential to insure understanding. Talented students often have learned to do this effectively on their own; average students can be taught to be more effective. If questions such as, "What was the central underlying concept of today's class?" or, "What is the step-by-step procedure through which we applied this concept to arrive at a successful solution?" are reviewed by the group as well as the aspects of how restating the concept or altering the process might lead to improved understanding, then students leave the class with more comprehension of the material than they would have without processing.

To use cooperative learning successfully involves the development of management skills rather than the acquisition of knowledge about learning theory, or the development of enthralling oratorical skills. Cooperative learning has much in common with the "Quality Circle" management techniques of Edwards Deming and Joseph Juran. Acquiring these skills is like learning to ski; one has to start modestly and practice. However, once the skill is acquired, the act becomes exhilarating, and one can cover distances in ways not previously imagined.

REMINDER!! If you have not yet signed up for the free workshop on cooperative learning from 9:00 A.M. to 4:00 P.M. on February 22, at St. Cajetan's, do so <u>now</u> by calling 556-4915. Only registered attendants can receive a bound set of notes, a copy of *Active Learning: Cooperation in The College Classroom*, and lunch, along with the all day workshop taught by Dr. Karl Smith of the University of Minnesota.

* (condensed and modified from *Active Learning: Cooperation in the College Classroom*, Johnson, Johnson and Smith, 1991)

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Volume 2 Number 2 February, 1993

The *Student Management Team* Approach to Class Improvement— "TQM" in the Classroom

"Total Quality Management" (TQM) is a current buzzword (acronym) in management. Ideally, it is the successful application of the quality circle concept that Edwards Deming utilized so successfully to improve the quality of manufacturing in post-war Japan. In brief, the concept recognizes that every employee has valuable knowledge about how his or her particular job might be done better. When these ideas can be heard in a supportive environment so that the total organization is aware of the effects of the individual on the final product or service, and when a formal structure exists through which changes can actually be made as result of ideas and suggestions, the final product almost invariably improves. Further, morale at the workplace improves because employees feel empowered to improve their condition instead of feeling trapped in a situation where their suggestions are not valued.

Deming also was one of the first to recognize that quality cannot be "inspected in" by looking for flaws at the end of the process. Instead, final quality is possible only if attention is given to improvement throughout the process. Our "FCQ" procedures of evaluating the class at the final week and reporting the quality back to faculty is the perfect example of trying to "inspect in" quality at the final moments. As a means of bringing about improvement, it is doomed to failure. Often this inspection becomes the means through which faculty are embarrassed, punished and demoralized, but not helped.

The student management team develops quality through a different approach. Inherent in this approach is the concept of **shared responsibility for success or failure of a class by students as well as faculty**, and the **empowerment of students and faculty to work together for change**.

The student management team approach was begun by me in 1990 at the University of Wisconsin at Platteville through a grant from the U of WI System. When I left to take this position at CU-Denver, we had run 60 teams and surveyed over 240 student participants. Only one of those participants failed to list at least one improvement made as result of the teams' efforts. The student management team has proven to be one of the most positive ways to renew teachers by establishing dialogue between professors and students about teaching, and allowing a professor to work with his or her own students to meet the needs of the latter in ways that are continually creative. An outline of the attributes of student management teams follows.

ATTRIBUTES of STUDENT MANAGEMENT TEAMS

- **Voluntary on the parts of students and professor**
- **Consist of 4 students plus professor**
- **Students from same classroom**
- **Students have a managerial role and assume some responsibility for the success of a class**
- **Students meet weekly; professor attends every other week**
- **Meet away from classroom and professor's office**
- **Maintain log or journal of suggestions and progress**
- **May focus on the professor or on the content**
- **Utilize group dynamics approach of researchers and industry's quality circles**

Despite the current enthusiasm for "TQM," about half of all such quality circle efforts in industry fail, and for well-known reasons. To help team members avoid failures, this office provides ***A Handbook for Student Mangement Teams*** which provides instruction for faculty and student team members, as well as a brief "crash course" in quality circles. A copy of this handbook is being sent to the secretary of each department on the UCD campus, and you can examine it in your own department. About 160 colleges have purchased copies of this booklet since it was announced in *Teaching Professor* last March.

Any faculty member with an interest in forming a student management team should attend the **Monday, March 8 presentation, *Building Academic Community Through Student Management Teams,* from 3:00 to 3:50 P. M. in Suite 150 of the Dravo building**. Feel free to bring a student or two along for this. Refreshments will be provided.

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Volume 2 Number 3 March, 1993

Upcoming Workshops on Teaching by Discussion

Knowledge that is retained longest in memory and understood at its level of greatest detail is that knowledge which people actively construct for themselves. Any teaching method which permits students to actively confront material and engage in its use is a method that is likely to be successful in producing lasting intellectual growth. The traditional method of simply lecturing to students and having them assume a passive role of note-taking brings knowledge to students, but seldom lets them actively confront the material, reconstruct it, or personalize it so that it becomes a permanent and useful part of their own knowledge.

Most of us can demonstrate the effect of such self-construction to ourselves by simply recalling what our most memorable moments of learning were during college, and what experiences produced in us the most solid grasp of our field. When we ask our colleagues to recall such instances, it is rare when examples reported took place while listening to a class lecture. These recollections more often are of revelations that took place while doing theses or dissertations, of memorable experiences on a field trip or in a summer internship, in an independent research course, or in a discussion with others. Almost invariably, the most indelible memories were produced when the student was an active participant in constructing knowledge.

Faculty are likely to embrace research as an essential part of a successful academic life because research projects and discussions with colleagues are places where we construct our own knowledge, and these events are often where we experience profound learning in our own careers. Our challenge for professors as teachers is in how to move the dynamics that produce such memorable learning into the classroom where such experiences are not as frequent as we would like for them to be. One excellent method through which to do this is the "case method," which was developed to a high degree by C. Roland Christensen of the Harvard Business School. The case method (one specific kind of discussion teaching) utilizes a carefully prepared "case study" that has been written so as to permit teaching through discussion and questioning, with a special emphasis on the process of learning and use of knowledge. It is written in a narrative style, structured to encourage student involvement, and provides the data required for analysis of a specific situation. The most successful cases are usually based on actual occurrences or experiences.

Lynn Rhodes of our UCD campus provided a very good seminar on the case method on February 17 in UCD's College of Education. There she demonstrated that discussion teaching has applications in many content areas.

We fortunately have faculty at UCD who are accomplished at using discussion methods and are also experienced in teaching discussion methods to other faculty. **Three of these faculty, Michael Hayes (Marketing), Peter Bryant (Business and Administration), and Catherine Wiley (English) will each contribute a third of a short course on discussion teaching. Meetings for the discussion teaching workshop will occur on three Mondays: March 15, March 29 and April 19 at the Executive MBA Auditorium in Suite 150 of the CU Dravo building from 1:00 to 4:00 P.M. Refreshments will be provided. Registration for this short course is limited to 20 faculty, and each of the lucky 20 will receive a copy of C. R. Christensen's *Teaching and the Case Method* (290 p.).**

Register by phoning the Office of Teaching Effectiveness at 556 - 4915 before March 10.

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Volume 2 Number 4 March, 1993

Our Personalities — What We Think Matters; What Our Students Think

What we think we are conveying to students is not always what they perceive, and behavioral traits we think should matter in class are not always the same that students would pick. In summary, we see things much differently from opposite ends of the classroom, and what students perceive heavily affects our student evaluations on global questions that describe overall satisfaction with instructor, teaching or the course.

One of the most insightful studies was done by Kenneth Feldman of SUNY at Stony Brook. Feldman compared personality characteristics of instructors with perceived importance to teaching as measured on global questions by professors themselves, by students, and by faculty colleagues.

PERSONALITY TRAIT	IMPORTANCE AS SEEN		
	BY SELF	*BY STUDENTS*	*BY PEERS*
Self Esteem	.30	.51	not rated
Energy (enthusiasm)	.27	.62	.51
Warmth	.15	.55	.50
Cautiousness	-.09	-.02	-.26
Leadership	.07	.56	.48
Sensitivity	.07	.53	.47
Flexibility	.05	.57	.46
Emotional Stability	-.02	.47	.54
Friendly	.04	.42	.49
Neuroticism	-.04	-.49	-.35
Responsible/ Orderly	.06	.31	.25
Brightness	-.05	.36	.22
Independence	-.12	.01	.08
Aggressiveness	.23	.05	.02

Correlations between personality traits of professors and evaluation of overall effectiveness as teachers. **(after Feldman, 1986)**

Feldman's study revealed that professors in general do not feel that their personalities have much effect on their teaching, but their students and colleagues disagree. In the large population that Feldman studied, values in the table above 0.2 are statistically significant; those higher than this can be useful to determine what traits are helpful to keeping student satisfaction high and making departments nicer places in which to work.

The only traits that all agree are important to successful teaching are self-esteem and enthusiasm. This tells us that one of the best things we can do to assure successful teaching at UCD is to build the self-esteem of ourselves and our colleagues. This is an important point for deans, chairs and administrators to know; any action that dampens enthusiasm or hurts self-esteem likely translates to damaged teaching performance in the classroom. The action of "putting someone in his or her place" has expensive consequences.

Things we are likely underrating in their importance are warmth, sensitivity, leadership initiative (not to be confused with mere aggressiveness, overcautiousness, and inflexibility which the research shows work against us), being friendly, and keeping a careful check on our own emotions on those days we feel overly stressed or overly tired. Being the smartest (brightest) or most original (independent) person in the department is not so important to teaching success as many other traits.

RESOURCE: Feldman, K. A., 1986, **The perceived instructional effectiveness of college teachers as related to their personality and attitudinal characteristics**: Research in Higher Educ., v. 24, pp. 139-213.

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Volume 2 Number 5 April, 1993

Classroom Practices — Which Ones Are Perceived as Important by Our Students?

In the last issue of *Nutshell Notes* (v. 2, n. 4), we looked at how our various **personality traits** can affect students' perceptions of our effectiveness as teachers. In this issue we'll look at some research that reveals how certain **practices** or behaviors can affect the same kinds of global evaluation.

This study comes from our northern neighbors at the Department of Psychology of the University of Western Ontario, Canada. The relationships between the practices of 124 professors and overall teaching effectiveness, as perceived by students, formed the basis for the table presented here.

In the table to the right, correlation coefficients larger than 0.3 are significant at the 95% confidence level. Although students of humanities, social science and science have different priorities, conclusions about useful practice are generally applicable across disciplines. It is important to establish rapport with students in any field, and developing clear communication skills should be a priority for teaching of any discipline.

In the sciences, important communication skills include clear speech, a friendly, interesting presentation style (expressiveness), providing examples to explain concepts and principles (emphasis), and making good use of class time to stay on track and cover reasonable amounts of material without digressing (pacing).

Abstract concepts in the humanities can appear especially elusive to students, thus strong communication skills are essential. Conveying the logic behind the structure (organization) of abstract material, using analogies and examples (emphasis), and establishing interest through relating subject matter to current issues and/or tackling of controversial issues in class are all good practices.

Behavior	Perceived importance to teaching by students of:		
	Humanities	*Social Science*	*Science*
Rapport	.43	.70	.59
Interest	.50	.71	.37
Disclosure	.30	.65	.25
Organization	.51	.56	.47
Interaction	.48	.51	.34
Pacing	.53	.45	.62
Speech clarity	.53	.45	.62
Expressiveness	.58	.59	.51
Emphasis	.61	.58	.51
Mannerisms	-.53	-.42	-.28
Use of Graphics	.22	.35	.37
Vocabulary	.16	.35	.37
Presentation Rate	.23	.14	.31
Media Use	.30	.23	.11

Correlations between certain classroom behaviors and overall teaching effectiveness (after Erdle, S., and Murray, H. G., 1986, **Interfaculty differences in classroom teaching behaviors and their relationship to student instructional ratings**: *Research in Higher Educ.*, v. 24, n. 2, pp. 115 - 127.)

Social scientists will most likely get positive responses from students by establishing interest (in ways just discussed), and by strengthening communication practices that promote involving students in active discussions. Clearly conveyed organization, which includes a preliminary overview of the lecture at the start of class, and deliberate preparation of students for what to expect on tests (disclosure) appear to be helpful practices to the successful teaching of social sciences.

The research shows that students don't assign great importance to audiovisual media use, and that specialty jargon (vocabulary) should be used sparingly in lectures. Annoying mannerisms such as "ums" and "uhs" harm lectures but can be caught in videotape analysis, and eliminated through practice.

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Volume 2 Number 6 April, 1993

Salvaging Benefits from the DEADLIEST Time of the Year

The deadliest time of the year for a professor is usually the final two weeks of spring classes. Students who cut a third of their classes now seem to come begging teary-eyed for an "incomplete" or an "extra credit project," while those who couldn't find your office all year suddenly seem to be camping there, demanding help with the material you covered in February. This is the time of the year when everyone discovers that time just isn't available to meet deadlines gracefully. It is not just the trials on patience that come from dealing with students' procrastination (although these can be trials with a capital T!) Such stresses are augmented when you are now at something like chapter 8 and planned to test on chapter 12 for the final exam. Stress can also come from department chairs, committee chairs and administrators who now realize that they must hold "just one more meeting" before faculty scatter for the summer. At the root of the problem at this time of year is the flood of term papers, exams, lab manuals, and journals to be graded, more exams to prepare, perhaps laboratories to clean, and maybe even having to give a paper at a spring conference (I met one UCD prof today who has to give three papers in late April — pray for her!) All of this results in working through weekends and getting 5 hours or less of sleep each night, which tends to remove some of the glitter from the more charming parts of our personalities. If you do not find yourself in one or more of the above situations, consider yourself to be the lucky exception. You might even recall being in the same predicament this time last year, and helping yourself and others to avoid that situation next year is the issue of today's *Nutshell Note*.

At the end of the term, there is a real temptation to "just get through it alive" into summer. In summer, we forget the horror show we starred in, and by fall we again begin to set the pattern for the same events to occur. Your best way out of being condemned to repeat unpleasant history starts with a blank sheet of paper. Tape it to the back of your door now; don't allow this paper to get onto your desk or into a file, where it will likely be churned out of sight during the mayhem of the next few days. Keep it accessible. As crises and irritations occur, record them on that sheet, and try to add a brief note as to how to correct them. An example from my first list was *"Being swamped with grading late student work—Change syllabus!"* My next syllabus stated: "No late work is accepted unless the student makes prior arrangements to extend a deadline." Students then knew the rules on deadlines from day one. Those who are sick or have work emergencies know to call and notify me; they are taken care of. I might not have thought to revise that point into my syllabus had I not recorded the problem when it occurred. If there is any disparity between planned coverage of material and the hard facts of realistic pacing, it is most likely to show up as a crisis in the final weeks. A compilation of any disasters noted during the last two weeks of the term and during the grading of final exams is one of the best keys to prevent reliving the same events in subsequent semesters. Consult the list when you lay out your syllabus for next term.

For now, if you are tempted to "cover the material" in a flurry of heavy assignments at the last minute, resist this— it's an invitation to snatch defeat from the jaws of victory. Keep your class out of crisis mode by simply "teaching less better." Colleagues may also be tired and overly stressed, so now is a good time to treat one another especially well.

A "list-sharing" (of the lists compiled on those sheets on the backs of doors) at your next departmental meeting may reveal shared problems that you cannot correct on your own, such as overloaded classes or unrealistic demands. Written records that acknowledge problems can be the first critical steps toward actual solutions.

Announcement of Special Teleconference on WOMEN in MATHEMATICS and SCIENCE EDUCATION — April 27, 9:00 - 10:00 A.M., North Classroom 4014.

Lyn Taylor of our School of Education has sleuthed out the interactive video-conference, *Connecting the Past with the Future, Women in Mathematics and Science*. This program focuses on the historical contributions of women in science, mathematics and engineering and will introduce role models in these fields. Of special importance to teaching is a presentation of why women are discouraged in math and science classes. The Office of Teaching Effectiveness is happy to sponsor this.

Thanks, Lyn!

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Volume 2 Number 7 May, 1993

BOTTOM-LINE DISCLOSURE and ASSESSMENT

The goals we set for a course are the basis for the answer to "*What are you trying to teach in this course?*" The review and test questions we formulate throughout the course invariably reflect our goals—what we want our students to know. We want our bottom line to be the top line in our students' minds, and the first day is the time to insure this. The tool you'll use is the bank of quiz and exam questions that is in your computer from the last time you taught the course. On that first day, you will establish "bottom-line" by using the entire bank of questions in a very special way to create a **knowledge survey**.

Copy all your quiz, test, and review questions into one giant file, in about the same order you intend to cover these topics in the coming days ahead. If you have thought of new material you'll add, make up a few new review questions on this material and add them. Delete any duplicates and number each question. You have now constructed a "monster exam" that covers the entire course. Make copies for each student in the class. At the top of the first page of questions, provide the following instructions to the students:

The following is the start of a value-added assessment. Use a soft pencil. Make sure your name and student ID number are coded on the answer sheet. Respond to each question in the following manner. Mark an "A" on the answer sheet if you can answer the question right now with present knowledge for test purposes; mark "B" if you can answer the question partially or would know exactly where to find the information required to answer the question within a short time (say, 30 minutes); mark "C" if you could not answer this question for test purposes, and you are not exactly sure where to find the answer. I reserve the right today to request full answers for a quiz grade to any three of the questions that you mark with an "A," so be certain that you assess your own knowledge accurately. When you are finished, keep the questions. Refer to them throughout the semester to mark your progress through the course. This survey will be given again at the end of the semester.

"General Purpose Data Sheets" are used for scan-processing of the A-B-C responses. NCS form #16504 allows up to 200 questions. If you want more questions, just use more forms. These forms are available for assessments from the Office of Teaching Effectiveness.

This basis for providing response is efficient. Students can cover 100 questions in less than 15 minutes in this format. Completion of the knowledge survey can also be done as a take-home exercise.

For your students, this is the most powerful action you can take in providing disclosure. It removes all need for students to guess the content that lies ahead, the difficulty of questions you will ask, or your emphases of material. Most important, it gives students a clear starting point from which they can begin to chart their own learning progress.

For you, this shows what kinds of preparation students are bringing into your class. If your class has common deficiencies, now is the time to discover them, rather than a month later at the first exam.

Finally, do assessment by repeating this exercise exactly at the end of the course. Thereby you will be able to validate the actual knowledge changes produced by every topic covered on every individual student. The Office of Teaching Effectiveness can save files and provide graphs of before-after results, or the results can be provided to you as ASCII files for your own graphing and reporting.

Despite its simple nature, this is a direct and powerful assessment that produces hard data about actual learning. Indirect methods of "evaluation" (colleagues' opinions, surveys of students' satisfaction) are important, but these are not actual measures of value-added knowledge. Your before-and-after sheets should be the basis for settling any dispute about how your students grew in knowledge through your course.

NOTE: A condensed version of "Bottom-Line Disclosure and Assessment" was published in *The Teaching Professor*, v. 7., n. 7, August-September 1993, p. 8. This reprint of *NN* v. 2, n. 7 updated Oct., 1994, to reflect changes in UCD scanning facilities.

NUTSHELL NOTES

"Teaching tips in a nutshell" — The University of Colorado at Denver's One-page Newsletter for Teaching Excellence

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Volume 2 Number 8 September, 1993

TEACHING PORTFOLIOS - I — DOCUMENTING SUCCESS and PROGRESS

When I attended my first Colorado Board of Regents meeting, the issue of "how much" and "how hard" professors work, especially how they spent their time in teaching, was being addressed by a recent poll of a few faculty. All faculty certainly knew that the demands on their time were much different than what was portrayed by some vocal legislators and angry editorial writers, but we found ourselves having to scramble in a last-minute "poll" to document the facts. The need for this scramble arose because we had not been documenting our teaching accomplishments to the same clear-cut degree to which we documented our research and publication accomplishments. In that respect, UCD was not unusual among other higher education institutions, but some other institutions have found that teaching portfolios are an effective way to document effort, success, and progress in teaching, and can even be a means to improve teaching. This issue of *Nutshell Notes* introduces the portfolio concept. My purpose in this month's issues is to allow readers to become aware of the teaching portfolio and its uses.

The teaching portfolio is a concise compilation that presents a professor's **teaching philosophy** and documents his or her activities, strengths, and accomplishments. It usually takes the form of an organized narrative of a few pages that must be read by review committees, followed by a set of appendices for optional reference that provide more detailed documentation.

The portfolio concept was born out of the need to provide a clear documentation of teaching as a scholarly activity. The portfolio has an advantage by documenting teaching quality and success from a variety of sources, including samples of student work, syllabi, formalized structured efforts at improvement, and educational endeavors that take place outside of class. In particular, it forces review committees, chairs and deans to look at a file of evidence rather than rely exclusively on numerical summaries from student ratings. Virtually all recent research has determined that an exclusive reliance on student ratings is a poor, and perhaps lazy, approach to teaching evaluation.

As a means to improve teaching, the process of compiling a portfolio encourages us to set aside some time to think about our teaching, to consider alternative approaches for reaching our students, to decide why certain practices have proven "good" for us, and to consider how and why our own approaches to teaching have matured and changed with time. Further, the act of creating a portfolio is often structured as an exercise done in collaboration with another peer, and the insights of another supportive colleague tend to broaden our awareness and break the isolation that many of us established by following, without much reflection, the tradition of exclusively structuring our teaching in private.

In workshops given on teaching portfolios, one of the most common exclamations that faculty members make is "I see that I haven't been giving myself enough credit for a lot of the way I spend my time!" This echoes a certain frustration we may have with our chairs or deans when we feel we don't get enough credit or positive reinforcement for the long hours we spent at our teaching, particularly after months characterized by working late nights and weekends. A reason we don't get due credit may be because our conventional methods of review simply didn't encourage us to keep good records or allow us to bring efforts to the attention of reviewers. The teaching portfolio approach tends to rewrite the contract about "what effort counts" by including a broader context as part of the evaluation process.

What kinds of materials enter a teaching portfolio? A more detailed list of useful entries will appear in the next issue, but, these can be broadly classified into the following:

(1) **Materials from ourselves**, including a perspective of our responsibilities, our goals, our central philosophy about teaching, and a summary of efforts that we have taken to enhance our own success in teaching.

(2) **Materials from others**, including student evaluation data, and colleagues' statements who have observed us or worked with us.

(3) **Products of good teaching**, that include evidence of our students' success in subsequent courses, in graduate school, in careers or in scores on regional or national examinations.

Reference: Seldin, P., 1997, *Tge Teaching Portfolio (2nd ed.)*: Bolton, MA, Anker Pub., 268 p.

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Volume 2 Number 10 October, 1993

Some Ways to Teach Content through Writing – I

Each discipline has its own unique concepts, techniques of investigation, modes of posing questions and problems, and ways of using data to work toward conclusions and interpretations. As professors, we use writing to profess our disciplines and to make our contributions to special areas of knowledge, and as teachers we are really introducing our students into the conversation of our disciplines. We can appreciate the power of writing as a means to learn when we reflect upon how our own understanding of our discipline deepened through writing about some aspect of it. We can help our students to use writing as a means to learn in many ways. A few examples follow.

(1) Writing of abstracts. Most of us have written abstracts as submissions for presentations at formal meetings and as essential synopses of our publications. After one learns the nature of abstracts and gains some experience in writing a few of them, it becomes easy to appreciate the level of mastery of material that is required to produce a really good abstract. The writer must not only recognize the most important points, but must be able to prioritize them and organize the writing from major concepts to specific details. It is a challenge to produce a solid rendition of significant content in 250 words or less. Some uses of abstracts as teaching tools follow. (a) Require an abstract as an alternative to the traditional laboratory report. (b) Require an abstract to be submitted for each text chapter as it is covered in class. Later post your own abstract of "chapter of the week" on your office door and have students compare theirs with it. (c) For courses that use journal sources, give your students the required article but with the abstract, the author's name and identifying markings cut off. Have the students write the abstract. Then post the original by the authors.

(2) Peer review editing. Provide a checklist and further reference to the appropriate style manual. Before you grade any submitted paper, have the students exchange their drafts and have each serve as an editor of another student's paper. Have each editor "sign off" on the reviewed paper and return papers to original authors to allow them to make corrections. Afterwards students submit their final draft with both their names and the names of their editors. Make editing a small part of the grade of each peer-reviewed assignment.

(3) Learning more from quantitative problems. Writing can be used to advantage in quantitatively based classes. Students often look for a formula or pattern through which to "plug and chug" to get the "right" answer. One can do many problems in this manner and learn very little of consequence. Consider how the gain in learning from assigned problems might be enhanced by the following: (a) "For each problem you worked in this assignment, describe, in three sentences or less, the pattern of logic required to solve the problem;" (b) "Last week you answered problems x, xx and xxxx in chapter n__. For each of these problems write one sentence that describes the major concept that you believe the author wanted to convey with the problem. Then write one sentence that describes what you learned by solving it."

Toby Fulwiler, director of writing at the University of Vermont, will provide short courses for faculty & staff on *TEACHING WITH WRITING,* Student Center Room 330, Thursday, November 11, 9:00 A.M. to Noon and 2:00 P.M. to 5:00 P.M.

Workshops are free to UCD faculty and teaching staff. Cost to faculty of other schools is $17.00 with the book, *Teaching With Writing*, or $10.00 without it. THE DEADLINE FOR REGISTRATION RESPONSE IS MONDAY, NOVEMBER 1. To register for the course, simply phone 556-4915, 556-2550, or send a note to Edward Nuhfer, Office of Teaching Effectiveness, UCD Campus Box 137. Specify your name, your department, and whether you are attending the morning, afternoon, or both sessions. Non-UCD attendants will need to specify whether or not they wish to receive the book along with the workshop.

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Volume 2 Number 11 October, 1993

Some Ways to Teach Content through Writing – II

This issue on use of writing as a teaching tool is continued from *Nutshell Notes*, v. 2, n 10. That issue outlined three useful practices: (1) writing abstracts, (2) peer review editing and (3) writing to understand quantitative problems. Here are two more practices to consider. Both are tremendous teaching tools.

(4) Maintaining a class journal. "Journals record each student's personal, individual travel through the academic world and serve as springboards for formal writing assignments; they generate life and independent thought in a sometimes over-formal classroom atmosphere. *Any* assignment can be made richer by adding a written dimension which encourages personal reflection and observation. Field notes jotted in a biology notebook become an extended observation written in a biology journal.... Personal reflections recorded in a history journal can help the student identify with, and perhaps make sense of, the otherwise distant and confusing past." (from Toby Fulwiler, 1987, *Teaching with Writing*: p. 16-17.)

Fulwiler suggests that journal-write activities can be used to "bookend" a class session. Students begin class with a five-minute journal-write on a topic of the day's session. This jump-starts the class with students' active engagement of the material. The class ends with another journal-write, wherein students summarize what they have learned and reflect back upon their entries produced at the start of the class.

Outside of class, journals sharpen students' powers of observation and allow them to relate course topics to real events. Assignments to collect references from news broadcasts and newspapers that are pertinent to course content, and to reflect in writing on the facts, slant and apparent credibility of presentations in the popular media are powerful for sensitizing students to the relevance of some subjects. Closing exercises that require students to make a journal table of contents and to reflect on what they have learned by journal-keeping can be a good capstone at the end of a course.

(5) Students writing their own test questions. When we first began to teach, some of our best learning experiences occurred from composing questions and seeing how students responded to them. Some of us may have formally studied the purposes, levels and the types of questioning but, if not, then experience usually gave us insights about how to write better questions. If we teach students how to write questions that elicit real depth in understanding, we allow them to share in one of the best of our own learning experiences. Often, giving a simplified taxonomy of questioning (like the following, with a few examples) is enough to start students toward understanding at a higher level.

Question level & type	**Often sounds like...**
1. *Recall*	"Who ...?" or "What ...?"
2. *Contrast*	"Compare..."
3. *Application*	"If.... then what?"
4. *Analytical*	"Consider..., then why...?"
5. *Conceptual*	"Here are three situations:.... State and explain a central unifying concept that links all three situations."

Collected questions can be used to promote in-class discussion and to compose review sheets and tests. This writing can be extended into a cooperative learning exercise, where each student prepares ten questions, a group of four students receives 40 questions passed from another group, and each group selects the best five for the review sheet and possible test purposes. Nothing adds more meaning to "Will 'it' be on the test?" than making students responsible for constructing "it."

Toby Fulwiler, from the University of Vermont – short courses on *TEACHING WITH WRITING,* Student Center Room 330, Thursday, November 11, 9:00 A.M. to Noon and 2:00 P.M. to 5:00 P.M.

Workshops are free to UCD faculty and teaching staff, but registration is required to allow us to order adequate books, materials and refreshments. The two workshops are different, but each is complete in the topics that it covers. To register for one or for both courses, phone 556-4915, 556-2550.

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Volume 2 Number 12 November, 1993

"VOCABULARY ACROSS the CURRICULUM"

WORD of the DAY

One of the problems associated with teaching on a city campus lies in how to start class when you know that some students are going to be unavoidably late from searching frantically for a parking space. This leaves many professors in a dilemma: "Should I start class right now, knowing that I may have to repeat my introductory remarks, or should I wait a two-minute grace period before I do anything serious?"

Tim Doffing of the University of WI at Platteville Mathematics Department provided me with a useful practice for increasing students' vocabularies that can make these first awkward couple of minutes useful to students who are present without placing latecomers at a serious disadvantage. I watched Tim teach "word of the day" in his calculus classes and later heard enough good comments from students in my courses to know that they appreciated his mini-lessons in vocabulary. If many of us did this at UCD, our undergraduates would have more powerful vocabularies by the time they were seniors. In addition to the general boost it provides to literacy, it can be very helpful to those students who must take some type of exam, such as the Graduate Record Examination, that tests on vocabulary.

The idea is simple. Pick any word which you feel a college graduate should be familiar with. It doesn't even have to be in your field. If you are at a loss for words, the appendix to E. D. Hirsch Jr.'s *Cultural Literacy - What Every American Needs to Know* has 63 pages of double-columned gems that have been officially sanctioned by that author as worth knowing. Write the word on the board as soon as you enter class. Ask students to turn to their neighbor and see if each can explain the meaning to the other. Then poll the class for a meaning. Supply the meaning yourself if answers aren't forthcoming. The entire exercise should take less than 90 seconds.

One can use variations of this to introduce discipline-specific content. For instance "Geography Across the Curriculum" (place of the day) or "History Across the Curriculum" (historical character of the day) are fun themes that can broaden students' general education. The accumulated knowledge that results from a tiny investment of time at the start of each class can be impressive over a semester. I have employed variations of this practice in my geology classes as "mineral of the day" or "time period of the day" to enable students to arrive at learning both the common minerals and the geologic time scale without going through a more painful memorization session.

If the word is carefully chosen, it can be the start of an entire discussion about the concept or topic that you intend to teach that day. In addition to teaching vocabulary, this exercise gets students' minds actively involved and provides a kind of jump-start to the class that is a better use of time than having students sitting and waiting for you to begin the active work.

UCD Math Department Sponsors First *HOST* Workshop on November 19.

Dr. Bill Briggs designed the first all-day *HOST* (Helping Our Students Teach) workshop for the graduate T.A.s in mathematics. The day included a presentation on the history of mathematics education followed by a two-hour presentation from the Office of Teaching Effectiveness on non-lecture teaching methods. A pizza lunch was delivered in, followed by an afternoon of 10-minute mini-lessons presented by T.A.s that were videotaped and reviewed by the group. This was a fun and beneficial day. Other chairs who may wish to do this should call Bill for some pointers on setting a HOST workshop up for their own students. Then phone the Office of Teaching Effectiveness for additional help or presentations. This office serves T.A.s and adjunct faculty as well as full-time faculty.

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Volume 3 Number 1 January, 1994

Using YOUR Office of Teaching Effectiveness

This issue supplements the purple, folded brochure which should also be found in your mail box along with this newsletter. The Office of Teaching Effectiveness has been up and running for over a year, and has developed useful programs to serve faculty, staff, honoraria, adjuncts, and graduate students — anyone who teaches UCD students. There are some things that are helpful to know that will allow you to make better use of the established programs. Refer now to the brochure as you read this issue.

• **Newsletter *Nutshell Notes*.** This normally appears every two to three weeks but ceases publication during summer. Twenty-four of these have been produced to date, and single copies are also now mailed to a number of other universities. If you lack a complete set, back issues are available. ***If you have a useful practice or suggestion of your own, or a piece of literature that you deem is particularly good to present in condensed form, share it by becoming an author of an issue of Nutshell Notes.*** The only constraint is that your submission must fit onto one page. Send submissions to the address above.

• **Individual Consultation.** While I am not an advocate for published compilations of teacher evaluations on any campus, I have used the ones produced here to check the student satisfaction ratings of faculty who have made use of this office, and I am gratified when I see improvements in their ratings. The consultations based on surveys and videotapes, and the efforts made through student management teams (see below) have major positive effects. The consultation service is well worth using, and the survey takes only about 20 minutes of class time. Many faculty who don't use this service usually do not do so because the optimum time for doing a survey (between 5 and 9 weeks into the semester) passes before they remember the survey's availability. To avoid forgetting, ***construct your syllabus for the spring term with a date for an in-class survey***. Then phone my office during your first or second week with the time, date, room, and number of students so that I can conduct the survey at the time and place you have scheduled.

• **Workshops.** Major workshops are free to UCD faculty and involve a national expert presenting on-campus for a full day. Toby Fulwiler of U. of Vermont, Karl Smith of U. of Minnesota, and the ***upcoming February 18 workshop*** with Irvin Hashimoto of Whitman College are examples. Reference materials and food are provided. If we have space after UCD faculty respond by a deadline, we then invite faculty from nearby campuses on an at-cost basis. In addition to the content portion of the workshop, one of the nicest aspects lies in meeting people from other departments and other universities. How to best use these? — ***Register early*** when the call goes out by flyer.

Shorter workshops from one to three hours long use both local and off-campus presenters. The UCD President's Teaching Scholars have helped construct an array of short one-hour workshops to be offered this spring term. A list of these was in the last issue (v. 2, n. 13). If you have a request or a suggestion for a particularly good workshop topic, presenter, or upcoming videoconference, phone this office and ***suggest it***. It can probably be arranged.

• **Student Management Teams.** These are described in detail in the brochure, and are among the most effective and least intrusive methods of improving teaching and learning. If you elect to start a team, you should form your team after about 3 weeks into the class. This office funds students for a team, so you will need to ***let this office know you are forming a team as soon as you decide to do so***. Send the names, addresses, and student ID numbers to this office as soon as you have organized your team.

• **Maintenance of Resources.** Is there a book or videotape you've not found at the Auraria Library on college teaching, or is there an advertised resource that you think we should own? ***Orlando Archibeque*** (Campus Box 101) is our campus bibliographer for faculty development. Contact him directly and he will know if the resource you desire has been ordered already, or he can start to make the arrangements to procure it.

• **"Boot Camp for Profs."** This is a summer, week-long teaching enhancement conference that attracts faculty from throughout North America. UCD and Teikyo faculty get a bargain registration rate for the whole conference that barely covers costs of meals and materials provided.

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Volume 3 Number 2 February, 1994

Teaching With Writing Part 3: Tips From Toby—

(Highlights of Toby Fulwiler's Writing Workshop at UCD)

Five Minute Writing Exercise

In this exercise, students are timed and told to spend all of the five minutes in writing—"don't think to organize or structure— just write and let the ideas flow onto the paper in any order they come." This is a good practice with which to start class because the exercise helps students to empty their minds of distracting concerns and to become involved in just the material relevant to the forthcoming class. Subject matter can involve an assigned reading. One topic to address with this five-minute assignment could be a quote from the reading. Another approach might be to spend the time as an exercise in assessing confidence and understanding. This could take the form of: *"Write about any areas of the assigned reading that you found to be difficult to understand. Conclude with a sentence about why you think one particular area proved difficult."* You can then ask two or three students to read their statements aloud. Let students know that such brief writing assignments will certainly yield halting or fragmented sentences and that it is OK to read them in just that way. Use their concerns as a springboard to launch your class presentation.

Five-minute assignments can also be used as active learning breaks within lectures to assess understanding and to strengthen students' grasp of central concepts. Assignments can involve outlining a process to solve a given problem or to deal with a stated case situation.

Paired Letter Writing Exercise

A general four-step outline follows for this paired active-learning exercise.

1. Write a letter to your partner in which you describe a problem you are having with particular material in this class. (6 minutes)

2. Add a P.S. which reveals how you are feeling about this difficulty. (1 minute)

3. Deliver your letters, read the letter you received, and write back with help and advice to your partner. Comment back about his or her P.S. (7 minutes)

4. Return original letters and read the response to your letter. Write back and tell your partner how his/her answer helped you—or raise a further question if the response failed to help. (3 minutes)

Four Ways to Help Student Writers

1. When you provide a writing assignment, model the process yourself. For instance, do your own 5-minute assignment and read it to the class as you call on students to do the same thing.

2. Give positive reenforcement by acknowledging and validating students' contributions. This applies to both content learning and the process of writing.

3. Create purposeful writing assignments; build meaning and relevance into your topics.

4. Stress that the primary value of such writing is as a way to learn and to build a knowledge base rather than a way to produce a perfect piece of work. The first thoughts on paper need not be organized or developed in detail—the important part is just to get the thoughts on paper.

Writing Workshop # 2 is close at hand!

Don't forget to call 556-4915 to register for Irvin Hashimoto's workshops on teaching with writing on Friday, February 18, at room 330 in the Student Center, 9:00 A.M. to Noon and 1:00 P.M. to 4:00 P.M. **Name tags are made from your phone call, and *lunch served there requires a name tag*!**

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Volume 3 Number 3 March, 1994

First Steps into the Age of Information Literacy

About seven years ago, E. D. Hirsch, Jr. wrote a national best-seller, *Cultural Literacy,* which contained "5,000 essential names, phrases, dates, and concepts" concerning "what every American needs to know." The most frightening realization is that in the time that has passed since his book appeared, the sum total of humankind's knowledge has more than doubled!

As faster computers provide convenient desktop access into a seemingly endless universe with galaxies of scholarly information, the choice of "what our students need to know" will change through selective distinction between essential information, which students must indeed know, and reference information, which students must be able to access when needed. While the reference information one can obtain depends on the quality of essential information one possesses to access the full capabilities of any information system, retaining vast knowledge truly becomes less important than using it.

Information literacy requires that students become judicious users of information. Critical thinking will be exercised every time a decision is made about what to choose from massive resources with accompanying agendas, value messages, sophistication, and intended purposes—none of which may be explicitly stated.

Faculty of higher education have made great use of their own information literacy in their research, but have only begun to recognize the implications for cataclysmic changes in undergraduate teaching. "Progressive" forms of education now practiced as classroom "active learning" are only pale shadows of the possibilities that are opened when a classroom has immediate global access to information. Even in active learning, we professors have taken primary responsibility for what is taught by our writing of the textbooks, the collaborative exercises, and even the cases for discussion teaching. Soon our students will be able to study the day's topic on-line from dozens of texts and films stored in electronic libraries; they won't be limited by what we teach, assign, or provide. Because our students can more freely explore a topic, ultimately we won't be able to depend on any two students having studied the topic from exactly the same materials. Information literacy will free students from their traditional information-dependency on us; as a result, responsibility for learning will fall more clearly upon them. As faculty, we should expect to become less prominent as experts who dispense information and answer questions, but we'll become more important as facilitators who help students to locate, critique, and synthesize. The lack of library usage decried by E. L. Boyer (1987) in *The Undergraduate Experience* won't even be an option; in many courses the amount of student time spent as "library time" (in electronic libraries rather than the traditional campus building) could routinely become equal to class time. "Library science-across-the-curriculum" may become the access ramp of choice to the "information highway."

What could we do now to enhance our ability to educate students in information literacy? A start can be a mere exercise of reflection—looking at our most recent exam in a course to see whether we are emphasizing essential information or reference information, or looking at our most recent syllabus, to see if we have included any unit that will help our students to become information literate.

(This issue of *Nutshell Notes* was inspired by *Information Literacy, Undergraduate Improvement, and the Regional Accreditation Process*, a workshop presented by P. S. Breivik, D. L. Parkyn, and R. A. Wolff at the Annual AAHE Meeting held March 23, 1994, in Chicago.)

KEY to BETTER LECTURES!!

Mitch Handelsman, Case Professor and UCD's President's Teaching Scholar, will present a workshop on ***Improving Lectures***, on **Wednesday, April 6, at noon** in room 480, of the UCD ("Dravo") Building. (This is part of the series sponsored by UCD's President's Teaching Scholars & the Office of Teaching Effectiveness. This workshop was first requested by UCD's Department of Mathematics and the Graduate School of Public Affairs. All UCD faculty are welcome!!

CU - Denver's *Nutshell Notes* are available in alternative formats upon request. Call 556 - 4915.

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Volume 3 Number 4 April, 1994

Keeping Students Informed of Their Progress

The 60 point "Survey of Classroom Skills" is one tool we use at CU - Denver to help us to learn students' perceptions about specific aspects of our teaching. Response # 22, "Keeps students informed of their progress," is one on which most teachers do get lower ratings. Students view this as a grade issue.

Often the need for regularly informing students about their grade is not obvious. We may think: "If students took three exams, and we graded and returned these, then can't the students be relied on to divide the total of the scores by three to get their own averages?"

I used to believe that, and like most of us, my rating in this category was lower than in others. Then a faculty member came for my help. He was not happy about some aspects of his student evaluations, but on the issue about keeping students informed of their progress, he had scored a perfect five out of a possible five! "How did you do that?" leapt out as I pointed to the unusual score on that particular question. The individual informed me that he kept all his grades on a computer spreadsheet, so every two weeks he simply printed a copy of all scores and a current average (with student ID numbers and no names) and allowed this sheet to be passed through the class during the regular lecture. I too kept my grade-book on a spreadsheet, so I began to use his method.

What a surprise! The first time I did this, two of my forty students came up and wondered if I had mistyped their quiz grades into my records — I had done exactly that! I always knew that I was a ham-handed typist, and it suddenly drove home the point that my typed student grades weren't any more error-free than the rest of my typing. It justified to me students' apprehensions; many do wonder, with good reason, if we have the same set of numbers in our grade books as they have in their notes. Since that sobering moment, I religiously pass out my grade record every two weeks, and every now and then, an error gets caught. My ratings in this category are now high, and both students and I are happy about the benefits of keeping tabs of their progress together.

Teleconference on Women in Math and Science, Tuesday, April 26, 9:00 - 9:50 a.m. North Classroom 4014

This upcoming teleconference is part of the series, *Connecting the Past With the Future*, sponsored by the National Science Foundation. Each film in the series features a discipline, where the contributions of a woman scientist from the past are presented in the context of their influence on the present field, particularly as seen through the eyes of women who now practice the discipline. This conference's discipline is ***geology***, and ***Florence Bascomb*** is the scientist whose influence is examined by modern practitioners. Lyn Taylor of our College of Education initiated getting this series at UCD. Kudos, Lyn!!

Engineering, Mathematics, and Science Faculty Are Asked to Contribute to Sheila Tobias' Volume on Assessment.

Sheila Tobias, noted science educator, is producing a book on in-class testing practices in college-level science. She seeks contributions from science faculty who may have developed innovative or successful methods of testing. If you have a particularly successful method or practice that might be included, contact this office for the form and address needed to contribute to Sheila's efforts.

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Volume 3 Number 5 August, 1994

FIRST YEAR IN THE CLASSROOM: WHAT SEEMED TO WORK

Bruce Kirschner

Director's Note: *Bruce Kirschner began his first year of university teaching in 1993-1994 as an adjunct instructor in UCD's Political Science Department. He contacted UCD's Office of Teaching Effectiveness several months before he began teaching and has used the resources of the office extensively. Bruce was invited to write this article because of the unusual success he has demonstrated as a beginning teacher. He achieved outstanding ratings from students, and holds the record in results on UCD's Survey of Classroom Skills. We know that we hire adjunct professors because of their expertise, but we also often acquire individuals with unusual dedication and abilities as teachers along with that expertise. At present, we don't have a formal way to recognize and reward the most outstanding teaching accomplishments of our adjunct faculty—perhaps we should find a way.*

Bruce's observations are useful to all of us, but they are particularly suited to new faculty, honoraria, and graduate assistants who are here teaching at UCD for their first time. While it pained my pride to violate my own maxim for one-page newsletters (this one is continued on the back), the information is more important than my tradition. So— forgive me just this once— and thanks, Bruce!

The 1993-94 academic year marked my first year of university teaching as an instructor in public administration and public policy for the Political Science Department. I had been in and out of formal learning environments for most of my life, and I knew pretty well what I liked and didn't like about classrooms. I chose to depart from the traditional teaching paradigm of teacher as fountain of knowledge and student as open vessel. The results made for an exciting and rewarding year.

Serving as Learning Leader — My self-assigned role as coach, facilitator, consultant, and resource required me to get my students more actively involved in their own learning. Early in the semester, I scheduled after-class one-on-one conferences with each student to determine what their individual interests were so that I could lead them to the best possible classroom experience. These sessions were of great value because they helped me to learn early how I could constantly tailor the course to best meet students' needs.

Emphasizing Practical Application and Doing It in Real-Time — My field, like other academic areas, has challenging, current issues. Issue-oriented, supplemental newspaper and magazine articles produced high levels of interest. Students were motivated by class projects designed to be current, practical, and useful. As course projects, students independently researched a government agency and its operations or studied a public policy issue. This research required personal interviews. Students thus engaged the subject matter by closely viewing the inner workings of government machinery or of policy issues. Concurrently, they were developing useful research skills, such as interviewing, and also improving their writing and oral presentation abilities. Some even picked up promising job leads in the process.

Fostering Critical Thinking — The ability to critically examine the external environment and to make informed decisions is an invaluable real world skill. Promoting the development of critical thinking skills is not something students should be expected to get from the traditional lecture. To foster this ability, I sought out analytical tools,

(continued on back)

such as paradigms or models, that they could apply to many different situations. Using such tools as frameworks for inquiry encouraged students to ask the kinds of questions required to get the real answers. Motivating students to continue to ask questions and seek out the right information on their own was a constant challenge.

Seeking High Involvement — Most students seemed genuinely surprised that I was interested in hearing from them about how we could mold the course around their needs. In the "Public Policy and Administration" course, enough flexibility was allowed to examine two local issues of greatest interest to students and then to bring in selected speakers on these topics. Getting high involvement was simple: a round-robin brainstorm was conducted to generate a universal list of public policy issues; then each student spread a given number of votes to the list. Two topics easily fell out on top. The same process was used to select the speakers on these topics.

Being Up-front — Students, like most people, appreciate honesty, openness, and directness. One of the first things I told my students was that I wasn't an "expert" on the subject of the course: I didn't know as much as they thought I did, and they knew more than they thought they did. Tapping the class's "in-house" expertise proved beneficial. The syllabus and subsequent instructive sessions clarified my expectations, and even my requirements for proper spelling and grammar. Students like to know what's coming, so I was sure to provide them, at the start of each class, my detailed agenda for that session.

Mixing It Up — I found that employing a diversity of teaching methods helped to stimulate thinking and class participation. Lecture seemed most effective when introducing new material and using anecdotal experience to illustrate key points. I found all of the following of great value at different points: short videos, newspaper articles, speakers, collaborative learning exercises, case studies, anecdotes, and open discussions. I even demonstrated a national health care policy simulation game (called "SimHealth") using a laptop computer and overhead projection panel. The speakers included a small town city manager, the former Senate minority leader, an assistant commissioner of education, a former Colorado government lobbyist, a juvenile detention center director, a charter school dean, and a Colorado state representative. They served to integrate theory and practice. Having two or more speakers with opposing views in at the same time created a dynamic tension for an even more stimulating presentation. There is no shortage of enthusiastic and thought-provoking speakers in the Denver area who are willing to come and talk to a class.

Using the Teaching Command Center — Last, but far from least, I made extensive use of the Office of Teaching Effectiveness. It played a key role in my first year's success. The office is a veritable storehouse of resources that were instrumental in guiding me in the right direction. The mid-term evaluations I conducted both semesters were invaluable for making informed changes to my plans. The evaluations will be a fixture in my classes every semester, and I intend to continue to use the office on a regular basis.

NUTSHELL NOTES

"Teaching tips in a nutshell" — The University of Colorado at Denver's One-page Newsletter for Teaching Excellence

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Volume 3 Number 6 September, 1994

Considering *Alpha* and *Omega* – Relationships Between the Syllabus and Final Grading

Disputes over grades between individual students and faculty often get referred to chairs and deans, and some of these snits can escalate into law suits.

While faculty generally appreciate the connection between the syllabus provided at the *alpha* (start of the course) and grading at the *omega* (end of the course), others learn appreciation the hard way by losing an embarrassing fight for vindication. This issue should help readers avoid the latter experience.

Nutshell Notes, v.1, n. 2, provided a checklist of items that should be included in a syllabus. At least seven of these items can involve grades.

(1) Grading scale. Whether you use an absolute numerical scale or grade on a curve (many authorities recommend against the latter), the syllabus should precisely describe the performance needed to earn reported grades such as A, B+, C-, P, *etc*. To explain the scale really requires us to disclose the components (class participation, homework, *etc*.) that are considered in grading and how we will weight these components in calculation of final grades.

(2) Pre-requisite courses or skills . Whenever possible, the prerequisites listed in the syllabus should agree with whatever is listed in the catalog. Catalog-listed courses require approval by departments and curriculum committees, and the prerequisites are a part of the course proposal reviewed by these bodies. The instructor should not make up new prerequisites that are inconsistent with the catalog. If you want to insure that students do not take your course without listed prerequisites, (*i.e*. if you can't afford to end up both teaching your course and tutoring the prerequisite courses), then state bluntly in the syllabus: "Only students who have met the listed prerequisites may remain enrolled in the class." Be consistent between what you say orally to students and what you write in your syllabus. Any student who later complains about being unable to keep up as result of not having the prerequisites then has to accept full responsibility for his/her problem.

(3) Call to be made aware of students' special needs. A student with a diagnosed learning disability, such as dyslexia, or a physical problem, such as color blindness, may fear that he/she will be at an unfair disadvantage in a particular class. The syllabus should invite students who have special challenges that may affect their grade to inform you in private about their needs and to help make you aware of ways in which you can assist them. Reasonable means of accommodation can usually be found.

(4) Policy for missed tests; (5) Policy for late work; (6) Policy for absences; (7) Policy for extra credit work. Some students will miss classes and tests, will try to submit late work, or may ask for extra credit options. To deal successfully with these areas, a policy on each must be stated in the syllabus. If we don't state our policies, we will find ourselves put on the schedules of each of our students, or worse, will find ourselves one day dealing in the very dangerous business of inequitable treatment of individuals. After the class is in progress, attempts to later link grades to behavior can be seen as arbitrary; if a dispute arises from a student, we will likely lose. But if our policies are clearly stated in the syllabus as to how grades are affected by attendance, *etc*., we will almost certainly win any resulting dispute—even if our policies are not popular.

In summary, the simplest way to avoid disputes is to provide clear, thorough, honest, and respectfully stated rules and policies in your syllabus, and then to apply them fairly and equitably to all students.

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Volume 3 Number 7 October, 1994

Multiple Means of Teaching Evaluation: FCQs and "What Are My Other Options?"

In April, 1986, the University of Colorado Board of Regents approved a resolution that mandated use of a Faculty Course Questionnaire (FCQ) "designed to provide published information to students, faculty, departmental administration and the University's administration." The FCQ and similar forms invariably rely on global kinds of survey questions. Examples are: "Rate on a scale from A = very good through F = very poor."

1. This course as a learning experience.
2. This course compared to all your other university courses.
3. This instructor compared to all your other university instructors.

Results from global questions are highly consistent. Correlation coefficients between global items can be expected to run from r = 0.6 to greater than 0.8. This is to be expected, because global questions are all different measures of the same thing—student satisfaction. However, is student satisfaction a true measure of "good teaching?" By 1993, it became evident in the CU System that the measure in itself was inadequate as a means to evaluate the teaching of individual faculty members. In reaching this conclusion, CU's experience proved consistent with a huge amount of research on student evaluations. By 1994, it was mandated that multiple means of evaluation be employed. This mandate is also in accord with recommendations of researchers—that no single means of evaluation be used alone as a basis for merit ranking. "Additional means" suggested in CU System memos include: opinions of alumni, students, colleagues and administrators, self evaluation, and review of course materials such as syllabi, quizzes, examinations and assignments.

There are two other solid parameters that faculty at UCD can choose to measure directly in classes and then voluntarily submit as "multiple means." One would be a measure of "good practice" which would answer: "Does the instructor's style employ traits that research shows are helpful to students' success, and what are these traits?" This assessment of practices can be done by the UCD "Survey of Classroom Skills," a 60 item survey commonly given at mid-term. **The purpose of the survey is for self-help rather than for annual reviews and results from it are confidential**. Yet it does provide a "multiple means" if you choose to use it youself for such. A second parameter available for measurement is student learning. The questions: "Are the students learning?" and "What are they learning?" can be answered through use of a knowledge survey or "bottom line assessment" as described in *Nutshell Notes*, v.2, n.7. (Phone 556-4915 if you'd like a reprint).

Together, measures of student satisfaction, good practice, and student learning provide substantial evidence. All three measures require rapid computer processing of data obtained from in-class surveys, but these are now very practical for UCD faculty to do because of recent procurement of **a new optical scanner** that just replaced the old scanner that once operated in the now defunct UCD "Testing Center." UCD faculty have lamented loss of that facility for doing research surveys and scoring short-answer tests and quizzes. The new scanner, now temporarily housed in the Office of Teaching Effectiveness, is more versatile and useful. It has an ink read head, which means students may use pens or pencils to mark the survey. The only requirement is that the survey forms be printed in hues of red. At present, we use NCS Form No. 16504, which permits single responses of up to 200 questions. Departments that wish to use the scanner for surveys and testing should order their own red forms from NCS (call 1-800-367-6627). The scanner provides test and survey analyses packages, or you can choose to have the data read into an ASCII file that can be conveniently imported into the spreadsheet or statistics package on your own computer. For now, there will be a simple $15.00 flat charge for each batch of surveys or tests processed. The charge is used to maintain a service contract on the new scanner. There is no charge for either forms or processing to do the 60-pt. Survey or "bottom line assessment." To investigate making use of the scanner, call 556-4915.

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Volume 3 Number 8 November, 1994

Visual Aids for Class Handouts and Presentations – 1: Word Slides

This issue of *Nutshell Notes* will be the start of a series on how to prepare visual aids and make good use of them for classes. Research shows that any audience retains more of what it sees than what it hears, and we can use this principle to enhance the learning of our students. Computers in our offices now enable us to produce professional quality illustrations at low cost. Although computers open doors to better handouts and more visual aids, such aids can be used well or badly. It is easy to become trapped by technology through becoming more fascinated with the tools than with how our students are responding to them. We'll begin the series here with the basics of preparing simple black and white word slides for overhead transparencies.

Black and white word overheads are the fastest and easiest visual aids to make. They are particularly useful and require only a computer with a word processor, clear 8.5" x 11" transparency film, and a printer and/or copy machine to produce. Text used in the overheads can be saved for later updating or for reduced scaling for handouts. A crisp *sans-serif* font (Figure 1) in 18-point type is generally a good choice for lettering of word slides for presentations.

Because a class is very receptive at the start, a good opening practice is to stress the major concept of your session with a word slide. Show it and inform the class how you are going to lead them to understand the concept. They will have the class objective before them and a forecast of how they will reach it—a sterling start!

Benchmark word slides provide a progressive series of topics/points, each marked with a bullet or number. Use benchmark word slides to assist students in following the progress of your lectures. This helps students to stay with complex material and to better understand it by engaging one issue at a time.

Any visual aid worth making must be clearly readable by your audience or students. The classroom itself is an often-overlooked factor. The most crucial room characteristics are size and lighting. Try one of your overheads before class and check it yourself from the back row. In size, the room must have a large enough screen to permit clear viewing of projected text from these back rows. In lighting, the room should be bright enough to allow students to take notes and ask questions, but dark enough to allow use of the chosen projection equipment. Many of us teach night classes in rooms where lights are all wired into a single switch. This all-or-nothing situation is typical of rooms designed by people who don't teach in them. We can sometimes cheaply mitigate the design flaw in small rooms by using a small desk lamp placed in a strategic spot like a back corner, so that the room can get sufficient light that does not come from a distracting light source.

A blank, lighted screen itself draws attention, so turn off the overhead projector when you are not actively employing it. Finally, take time to physically point to key words and phrases on your visual aids as you speak. This will help adjust your presentation pace into one that can be better followed by students.

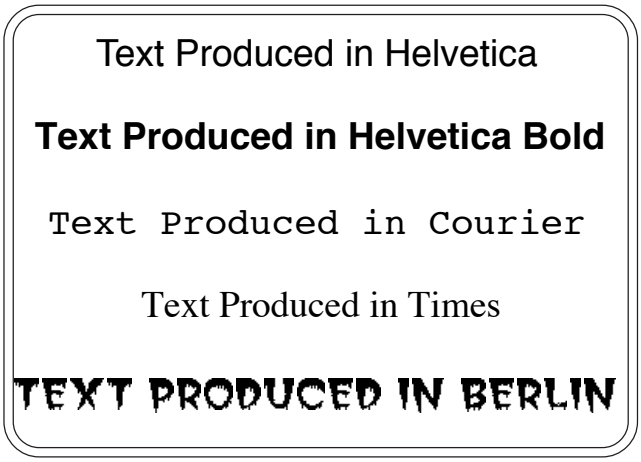

Figure 1. Text examples of fonts—all in 14-point sizes. Common computer fonts are Helvetica, Courier, and Times. For overheads, a *sans-serif* font like Helvetica is preferable. *Serif* fonts like Times are suited to manuscript body text. Courier's thin lines make it a poor choice for overheads. Decorative fonts like "Crypt" are hard to read.

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Volume 3 Number 9 December, 1994

Visual Aids for Class Handouts and Presentations – 2: Black & White Overheads

Some professors like to simply use line drawings directly from a book or journal. If your copier can enlarge, this can sometimes be an option; by filling most of your 81/2 x 11 transparency plastic with the image, you can often produce a suitable overhead. On the other hand, book illustrations are not designed to be overheads; what works in a book may not work in your classroom. Traits of journal illustrations that produce disappointing results are fonts that are too small and lines that are too fine. Make your overhead on your local copy machine, try it in the room in which you teach and look at it from the back row and sides. If results are not what you wish, you may need to do some drawing yourself

If your subject is one that tends to lend itself to teaching with visuals, your office computer should probably include a graphing program such as Cricket Graph® for the Macintosh or Harvard Graphics® for the PC. It should also include a good Postscript® drawing program such as Adobe Illustrator®. With a graphics program, you can often input data from a journal and quickly produce your own graphic that will make a good overhead (Figure 1). The figure took only 15 minutes to produce in Adobe Illustrator®. It is in Postscript®, so the single piece of artwork can be used for both overheads and handouts because it will remain sharp and clear when scaled at any size.

Many disciplines have sources of clip art and fonts that are pertinent to a subject, such as a periodic table for chemists or mathematics symbols for engineers. Clip-art outline maps are also worth owning. You need not then draw any map; just cut out the part you need, put your data onto it and print your overheads and handouts (Figure 2). Letter your graphics with Helvetica font.

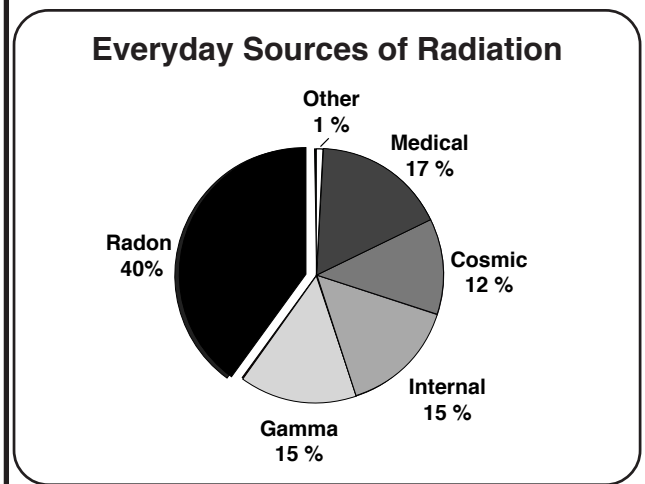


Figure 1. Pie-chart overhead produced from journal data.

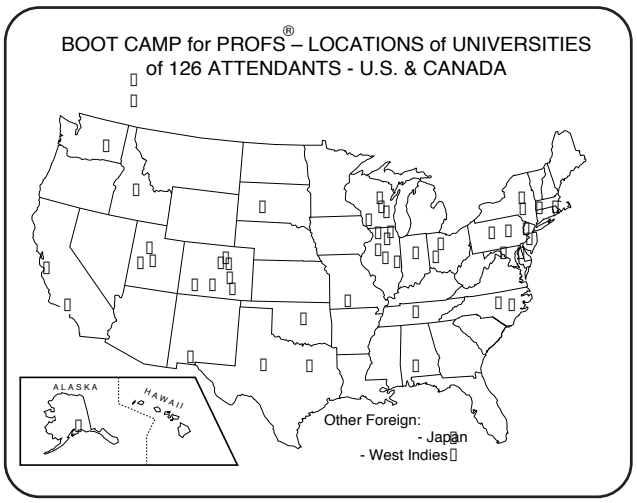
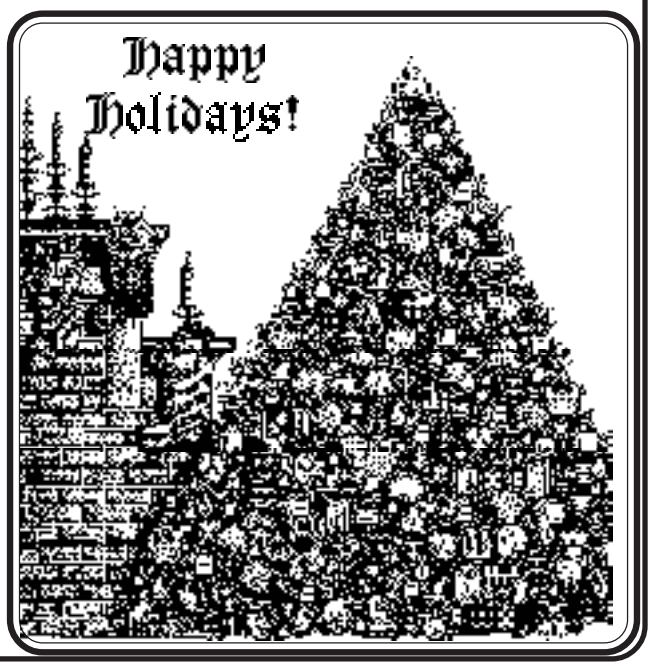


Figure 2. Map showing locations of attendants at Boot Camp for Profs from U.S. & Canada. The map is clip art; the star was simply copied and pasted where needed. Fonts are in Helvetica and the entire illustration is in Postscript®.



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Volume 4 Number 1 January, 1995

Visual Aids for Class Handouts and Presentations – 3: Color Overheads

The principles of lettering and clarity covered in the previous two issues (*NN,* v. 3, n. 8 & 9) hold true when using color. The value of color lies not in mere appearance, but rather in emphasis. A bright color like red can emphasize a singular point that you want to show (Figure 1) and can be used as a way to thread continuity through several illustrations (Figs. 1 and 2).

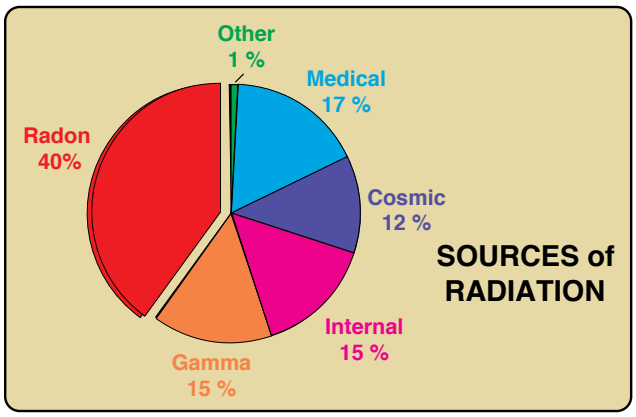

Figure 1. Sources of radiation. The class topic was radon gas in the home; this illustration served to place radiation contributed by radon in perspective. Red emphasizes the primary topic.

If you use the boldest, brightest colors sparingly, then your overhead will indeed provide emphasis rather than distraction. Color can also help to show gradational relationships (study Figure 3). Use of color does add complexity to design because light must pass through colored film on its way to the screen. Some colors, like dark blue, are attractive on the printed page but may prove to be too opaque for projection. You may also compose your graphic on the computer against a black background (Figure 3) so that peripheral white light is reduced. In this case, choices of font sizes and colors are critical to insure good projection. Initially, do a test film in your classroom with Helvetica font in various colors on black background; make note of combinations that produce good results, and then stick with these.

Color overheads are within your easy reach. For printing overheads directly from your own computer files, an excellent Postscript® printer is in the Media

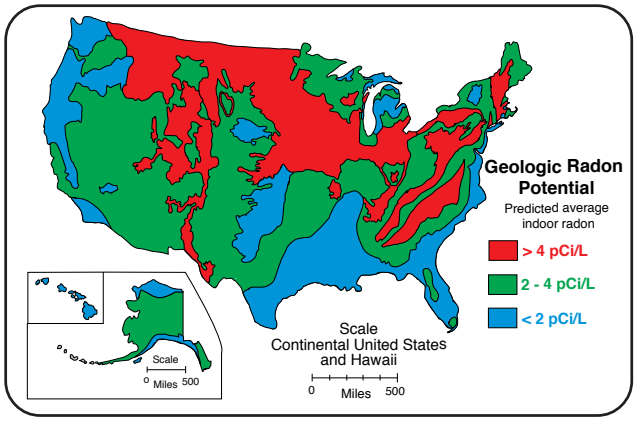

Figure 2. Map of radon distribution in the United States. This illustration followed Fig. 1 in lecture. Use of red to emphasize radon concentrations above 4 pCi/L (pronounced peek-o-curies per liter) is consistent with use of red to stress radon in Fig. 1.

Center in the lower level of the Auraria library. It was procured to serve faculty & teaching staff in preparing such overheads. Design help is also available there. (Contact Carolyne Janssen at 556-2455.) Alternately, color copy machines exist in the library and in the Tivoli student center (second floor). These produce overheads at about $3.00 each from color illustrations and even from color photographs.

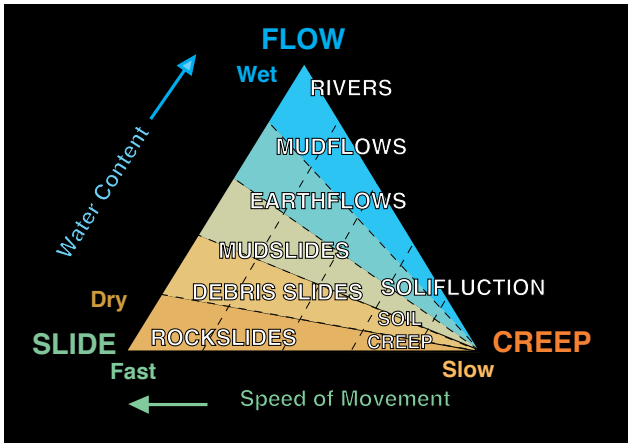

Figure 3. Classification of landslides based on moisture and speed of movement of materials. Students should have black & white copies of complex overheads. This one shows relationships; consider how the definitions of white outlined terms would be perceived if provided only by words instead of as a graphic.

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Volume 4 Number 2 February, 1995

Visual Aids for Class Handouts and Presentations - 4: Videotapes

Remember the movies that you were shown as a student? Often these were dated, worn from years of use, and ran in a projector that made noises like an old Jeep in need of a valve job. You probably don't remember much else about those movies, other than that they tended to appear when the professor was away at a meeting. With such experiences, it's no wonder that the prospect of using class time to "show movies" generates a reflex of suspicion. Yet films are good for much more than tending a class while we are away, and the availability of the videocassette recorder now gives us easy access to a wealth of inexpensive, current, and often excellent materials. Some subjects, such as the sciences, seem almost impossible to teach without graphic presentations. TCI's "Cable in the Classroom" project provides a magazine, indexed by subject, listing times and channels of several hundred hours a month of copyright-released materials that can be recorded at home and used in class.

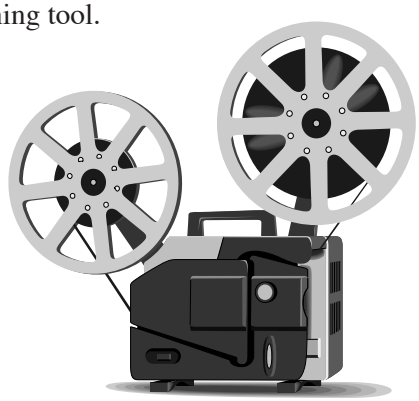
There are two kinds of tapes for class use. One includes the "trigger tapes," which are short (~5-minute) vignette films that usually present a role-play or case study. These contain little if any content but are used to generate thought and discussion. An example may be the portrayal of an assertive student approaching a professor just before an exam and demanding to be allowed to take the test later. (Does this sound familiar?) Obviously, the discussion is "triggered" about how to handle this case, and then into variants which might change the options and choices available. One good trigger tape can generate an hour of lively thought and discussion. In some subjects, a short clip from the evening news or C-Span could serve as a trigger tape or as a timely introduction into the day's topic.

The other kind of tape is the content tape. It may be a natural history documentary used in a geography class, a dramatization of a novel being read by a literature course, or a presentation of how the world's great cathedrals were constructed for an architecture seminar.

Like any other audio-visual aid tool, tapes can be used well or badly. Two ways to guarantee disaster are (1) not to be sure in your own mind about what you specifically want your students to learn from viewing a tape, or worse; (2) not to have studied the tape carefully yourself before you use it in class.

In using a trigger tape, make a list on an overhead transparency, in order of importance, of those specific things you want to be sure that the students consider. In a good discussion the students will likely cover most of these, and perhaps some that you haven't thought of, but regardless of whether they do or don't, use the overhead to provide a summary at the end of class. This will help insure that students don't leave your class without connecting with the aspects that you consider important.

In using a content tape, outline what you want students to learn from it in the form of a written set of reproduced questions that are arranged in the order the topics will be encountered in the film. Leave enough space between questions to record notes. Give the students time at the start of class to read through the questions before you start the tape, and give permission for any student to call "STOP!" if there is a point they miss or a question they need to consider. If your classroom VCR has a remote control, give the control to a student along with the permission to call "STOP!" Students are less shy about asking their peers to interrupt the tape. Properly used, content tapes are a great teaching and learning tool.



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Visual Aids for Class Handouts and Presentations - 5: Slides

The 35-mm slide once was the standard for formal presentations. Today, we produce digital slides with graphic software, digital cameras, and inexpensive scanners.

The 35-mm slide had a width-to-height ratio of 3 to 2. Illustrations intended for LCD projection using PowerPoint® should be laid out in similar proportions in order to make the best use of the projection screens, which have not changed since the days of 35 mm slides. Font height needs to be at least 3% of the longest dimension of the figure. This translates into minimal font sizes of about 18 to 24 points for text on a PowerPoint® graphic.

In slide design, three guide-words apply: **SIMPLICITY, CLARITY** and **EMPHASIS**. A slide is used to transmit only a single idea. It is not a reference source, so simplify it by removing non-essential visual elements such as grids, borders or redundant labels. If you draw a graph, there is no purpose served by a label that states "Graph of...." or "Relationship of... to...." It is already obvious that the visual is a graph and displays a relationship.

After reaching the simplest design, check for clarity so that all parts of the slide will be large and dense enough to be visible. Be certain that the visual aids actually emphasize the point(s) to be made in speech. Emphasis can be changed by mere choices in line boldness. Suppose we draw a best-fit line through a series of data points on an X-Y graph, and the graph's axes are thicker than our best-fit line. We may intend to emphasize the data in our speech, but the axes, not the data, are what will get visually emphasized by this illustration.

In Steven Spielberg's film, *Schindler's List*, the most unforgettable scenes are of the child dressed in red in this otherwise black and white production. Sparing use of selected colors is likewise a powerful tool for emphasis of selected points in slides. Choose a bright, contrasting color, such as yellow set on a darker blue background or bright red set against drab colors. Then use the color solely to emphasize the most important points.

Just as we cannot easily understand a speaker who attempts to make several points at once, we cannot quickly comprehend a slide that attempts to emphasize multiple points. Make just one point per slide. In a formal presentation; it is <u>not</u> a good decision to tell all details with many slides. The "mystery format" that makes one work to acquire many clues to solve a mystery is good for teaching students how to do research, but the reverse format excels for presenting research to peers. For this, draw one or two comprehensive statements together from the lesser details, and get these major points onto slides to show near the beginning. Conveying conclusions early allows us to give a relaxed tour of our reasoning that an audience can understand. The sooner the audience can see a destination, the sooner they can comprehend and reflect on our reasoning without stumbling (or grumbling!).

Most flat bed scanners yield poor quality in the conversion of older 35-mm high-quality color slides into newer digital format, Good quality conversion requires a specialized scanner available in most university media centers. Many of us want to employ the illustrations we use at conferences in our appropriate classes, and we should bring some of our own scholarship to our students. We only need to keep in mind the differences between the levels of our peers in conferences and our students in classes.

NUTSHELL NOTES

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Office of Teaching Effectiveness
1250 14th St. Room 700
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Volume 4 Number 4 August, 1995

Our Teaching Philosophies - Forming Our Centers of Strength

All well-developed areas of knowledge have central concepts from which they operate. Whether the disciplines in question are as far removed from one another as are science and physical sports, if central concepts are not truly stressed to learners, then there is a likelihood of amassing considerable disconnected knowledge and gaining false confidence in it. Disconnected knowledge is inferior to a system of knowledge. True systems are developed only when core principles are recognized, and lack of central concepts is a trait representative of a discipline in its infancy, not one that has established status. An individual with a keen, reflective mind who practices long enough with disconnected knowledge will often establish the connecting relationships, and his/her practice of the discipline then takes a quantum leap in being more effective. But such insights can be gained faster if deliberate effort is made toward establishing and refining concepts.

In teaching, it's easy to be lured into fascination with methodologies and not reflect on what this means to those broader concepts we should define for ourselves. We may say: "I will use active learning methods" or "I will teach critical thinking"—both likely to be good aspirations, but we may end up feeling that we never quite enacted our aspirations to the degree that we had hoped. Writing a teaching philosophy—**and using it**—is the best way to accelerate development of a major center of strength for teaching practice. Consciously getting the core tenets of our philosophy onto paper is essential to building a system and breaking with practicing through disconnected knowledge. As we reflect on our philosophy throughout our practice, we can easily see whether what we intended to do was actually what we enacted. We may discover that we became unsatisfied with a teaching experience simply because we did not do what we most wanted to do!

Every action in teaching—preparing our syllabus, preparing for a single class, or writing a test— should be consistent with our teaching philosophy. For example, let's say that we aspire in our philosophy to respect our students and to treat them as we ourselves wish to be treated by authority figures. A reader of our syllabus alone should then be able to deduce that we esteem respect as a core tenet of our teaching philosophy. On the other hand, if every irritating infraction we have experienced gets translated into the syllabus as a series of threats against future trespass, then the syllabus will read like a scold sheet, and we'll have sabotaged our own best intentions. We'd have an easier time if we gave great attention to writing our rules so as to convey that respect is the dominant basis for such rules. Another example would be to examine our stated philosophical intent to engage students in active discussions, and reflect on whether we practiced that in our last class. Perhaps we lectured the class so that no voice was heard other than our own, and our aspiration was inconsistent with our practice. Finally, suppose we set critical thinking as one of our cherished philosophical goals, but we aren't satisfied with our students in this regard. If we look at our most recent examination for our stress on critical thinking and discover that we constructed over 95% of the test around memorized facts and "plug and chug" problems, we'd likely make more resolve to better enact our intentions. Writing our teaching philosophy is not an unmerited exercise; it helps us to do what we truly want to do.

It is no accident that the teaching philosophy is the core of a teaching portfolio. Annual review files built around concepts are more clear than those based on disconnected facts. Once we have written our teaching philosophy and reflected upon it in practice, demonstrating that we successfully practiced our own teaching philosophy becomes straightforward.

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Volume 4 Number 5 September, 1995

DATE of WORKSHOP: What is the 4MAT® System?

We can recall some former teachers as our favorites, and yet know that these same teachers were disliked by some other students. This paradox parallels our experience as instructors; we look at students present on the first day of a class, and expect that we will successfully teach some, yet be unable to "reach" others. This results in part because only a few students in our classes are likely to learn in the same ways that we learn, and we tend to best "reach" those students who are most like us.

The 4MAT® system, developed largely by Excel, Inc., of Barrngton, Illinois, is designed to help us "reach" a higher percentage of our students. It is an integrated approach to teaching that pays special attention to the different ways in which students perceive and process information. These ways are often termed "learning styles" by researchers.

The 4MAT® model consists of four instructional goals: (1) Motivating students, (2) Teaching ideas and facts conceptually, (3) Experimenting with Concepts & Skills, and (4) Integrating new learning into real life. It addresses four styles of learners: (1) those who learn by *listening* and sharing ideas, (2) those who learn by *conceptualizing* — integrating their observations into what is known, (3) those who learn by *experimenting*—testing theories in practice, and (4) those who learn by *creating*—acting and then testing their new experience. A lesson in the 4MAT® system will present material through experiencing, conceptualizing, experimenting and creating. Further, it presents to each style in a way that has students connect to material through using their minds in both analytic and intuitive ways.

4MAT® has been embraced at a number of universities, and there is considerable literature at all levels of education on the outcomes of using it. Excel, Inc., offers several training sessions each year on use of 4MAT®, and offers in-depth programs that produce trainers.

Dr. Roxanne Byrne of the UCD Department of Mathematics recently completed the final session required to become a trainer, and by doing so she has provided a valuable resource to UCD. Dr. Byrne will provide the introductory workshop to 4MAT®, on **Friday, September 22, at 1:00 P.M. in Room 004 of the Media Center**, which is located in the lower floor of the Auraria Library. Please E-mail enuhfer@carbon.cudenver.edu or phone 556-4915 to register so that we can have sufficient materials and refreshments for attendants.

An Afternoon with Linc Fisch

The Classroom as Dramatic Arena

Tivoli 320 C - 12:00

Tuesday, November 7

UCD is very pleased to host the presentation, *The Classroom as Dramatic Arena*, by Linc Fisch. Linc is one of the best known names among faculty developers, with tremendous experience that encompasses teaching, faculty development and producing materials for teaching enhancement. *The Classroom as Dramatic Arena* receives outstanding evaluations at conferences and universities where it has been presented. Phone 556-4915 or E-mail to enuhfer@carbon.cudenver.edu to reserve a spot. Don't miss it!

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Volume 4 Number 6 October, 1995

The ASSESSMENT Word: What's Involved?

"Assessment," at its worst, conjures up images for professors appropriate to the Halloween season—a house of horrors! Lurking within lie bureaucratic paperwork and endless committee meetings seemingly designed to divert faculty time away from teaching and into drudgery of questionable benefit.

This "A-word" often crops up with another A-word—"accountability." Last year's Teaching Committee of the Faculty Assembly at UCD recognized how often faculty and institutions are under mandates to assess teaching, and therefore the committee selected "Assessment" as the theme topic to be focused on by this office in academic year 95-96.

There is good reason for this selection; assessment done poorly can at best be a waste of time and at worst be destructive to collegiality. However, when well done, assessment can improve the quality and enjoyment of teaching. An institution that learns to do it well can give itself some deserved accolades—both for avoiding constructing a house of horrors and for generating many options for continuous improvement.

In the August issue (v. 4, n. 4) of this newsletter, we described the core of building our personal teaching system as resting in being able to define the key points of our own teaching philosophy. Thereafter, "assessment" becomes a fairly straightforward exercise of demonstrating that we practice our philosophy and that we produce good results.

Assessment can begin at (1) the level of daily or weekly inspections of our classes by classroom assessment techniques (CATs). These are largely brief instruments like the "one-minute" or "muddiest point" papers. These methods provide quality controls that help us to know if our students are learning in the ways that we believe that they are, and define those topics that are giving our students the most difficulties. Assessment can also take the form of (2) inventorying what teaching skills are actually being employed in our classes. Formative surveys such as UCD's 60 point "Survey of Classroom Skills" help us to analyze our teaching and to see what more we can do to improve students' learning. We are all familiar with (3) summative evaluation through the CU System's Faculty Course Questionnaire (FCQ), which primarily measures students' overall satisfaction with the course and instructor. For complete assessment, we also need (4) a fairly direct measure of students' learning such as a knowledge survey given before and after the course or a review of exams, quizzes, or graded projects.

A "teaching portfolio" is a way of presenting our teaching philosophy, assessments and other supporting materials in a brief package that will allow any reviewer to easily see what we do and what results we obtain. In the forthcoming months, we will present workshops and newsletters that detail all of these aspects of assessment. A high point of the year will be a workshop on the teaching portfolio led by the dean of teaching portfolios himself, **Peter Seldin of Pace University, on February 2, 1996**. The next issue of *Nutshell Notes* will provide details on signing up for this workshop.

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Volume 4 Number 7 November, 1995

A Global View of ASSESSMENT

In our last issue, we reviewed some aspects of past *Nutshell Notes* that applied to assessments of our teaching. In this issue, we'll develop a global perception of assessment.

Considerable discussions from members of many universities provided this recent definition of assessment as a process:

Assessment is an ongoing process aimed at understanding and improving student learning. It involves making our expectations explicit and public; setting appropriate criteria and high standards for learning quality; systematically gathering, analyzing and interpreting evidence to determine how well performance matches those expectations and standards; and using the resulting information to document, explain and improve performance. When it is embedded effectively within larger institutional systems, assessment can help us to focus our collective attention, examine our assumptions, and create a shared academic culture dedicated to assuring and improving the quality of higher education.

from T.A. Angelo, November, 1995, AAHE Bulletin v. 48, n. 3, p. 7.

From the above, we see that good assessment involves devising a systematic way to gather and use selected data as part of our day-to-day activities. This stands in sharp contrast to the punctuated "assessments" that often result from inept responses to a mandate for accountability. The latter is usually what gives assessment a bad image in the minds of faculty. Defensive gathering of data is never a sustainable way to operate. Such efforts drain resources from essential duties, and while they may produce reports, they don't result in the desired outcome—an institutional culture that understands continuous improvement as part of daily activities.

When assessment is absent, crisis-management usually takes its place. The latter is typified by episodic events of laborious, broad data-gathering in response to a criticism or mandate. Data-gathering is followed by efforts to achieve insights from a muddle of information, and the event culminates in the usual hastily written (hopefully credible) thick report that is soon filed and forgotten. Such hapless events will likely be relived anew, with slight variations, every few years. In contrast, assessment continuously gathers essential data in ways that address clearly formulated hypotheses. More importantly, assessment creates a system of routinely utilized knowledge that can be easily built upon. Assessment prevents crises.

While learning is complex, a trait of good assessment is still a certain simplicity. A user or reviewer should be able to understand easily what expectations are being tested and what constitutes successful performance. If an assessment plan is convoluted, it won't be understood and therefore won't be successfully implemented.

Even good assessment plans can have their results torpedoed by reporting that does not address the needs of readers from the general public. A document replete with the passive voice of bureaucratic writing, purple prose, and "adminibabble" jargon does not make "... expectations explicit and public...." Where funding and support depend upon demonstrating good use of resources, it is imperative to present assessment in a way that the public can understand. Expectations, results, and the systems put in place to assure quality should be clearly stated.

Finally, the purpose of assessment is not to identify for punishment "those who don't measure up." Any evaluation program not accompanied by a system that supports improvement is not assessment, but rather is a counter-productive exercise. Assessment, at its best, produces collective pride by allowing everyone within an institution to identify themselves with high standards of student learning, commitment to improvement, and an experience of support for that commitment.

SEE WORKSHOP ANNOUNCEMENTS on BACK of THIS NEWSLETTER

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Volume 4 Number 8 December, 1995

Getting to DOING Assessment: Ten Principles for Practice

1. Successful assessment requires an environment that is receptive and supportive. Receptiveness requires faculty who are aware of potential benefits; supportiveness requires trust, good morale, and a spirit of academic community at the campus.

2. The assessment of our students' learning begins with our own educational values. Only these can determine our choices for what and how we assess.

3. Assessment of any course, program, or other educational unit can proceed only after purposes of the course, program, *etc*., have been explicitly defined in writing. Gathering data first and deciding purposes second equals much work for little return.

4. Assessment requires more than measures of results. It also requires an evaluation of the processes that lead to the results, and a reflection upon why particular processes were chosen.

5. Reporting information in response to a mandate is not assessment. Assessment is to such reporting as automobile maintenance is to roadside breakdowns. True assessment is an ongoing process that is a regular part of instruction.

6. The best assessments result from collaborative study, with the review and suggestions coming from a broad base. Our courses ultimately come together to serve a department's clientele, a college's role, and a university's mission. Being certain that we are indeed serving as we intend involves review from people with different perspectives. One caution: "review" is <u>not</u> hierarchical, top-down micro-management. Distributed ownership of responsibility is required for success.

7. Assessment should focus on the issues that users of the data most care about. What is important should be agreed upon at all levels of review before data is gathered. Few things destroy assessment so thoroughly as playing the shell game with issue priorities. If managers state that an issue is of primary importance, then it had better remain <u>the</u> key issue when the data gathered in assessment are used for those managers' policy decisions.

8. What is done with results determines whether assessment will be incorporated into the institutional culture or discarded. Assessment will be successful when it is part of a commitment, from bottom to top, to <u>promote change</u> for the better. Improving the quality of students' learning must be an action-issue for planning, budgeting and personnel decisions, so that faculty can realize that results justify their labor. When student-credit-hours-generation is the only game in town that determines real policy, and assessment results are not used to produce any substantial change, faculty are quick to realize when their valuable time is being consumed to no purpose in a mere charade dubbed "assessment."

9. Assessment aims to present an accurate picture of learning. Learning is a complex process, so assessment may allow for diverse methods, but ultimately the most powerful evidence of successful student learning is that which demonstrates change for the better in accord with well-defined goals.

10. Through assessment, educators demonstrate commitment to continued improvement in order to serve students in the best possible ways. In turn, those to whom educators are accountable have an obligation to really support educators' efforts toward improvement. Both educators <u>and</u> those to whom they are accountable are ultimately responsible to the public.

This newsletter is based upon results from many workers, as organized in T. W. Banta and others, 1996, ***Assessment in Practice***: San Francisco, Jossey-Bass Pub., 387 p.

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Volume 5 Number 1 January, 1996

Evaluation of Our Students I—Grading in General

In this year's theme, assessment, we have covered quite a bit on assessment of ourselves and of our programs. Evaluation is often confused with assessment. We evaluate individuals' performance, but we assess student learning of units sucyh as classes and programs as a whole. Evaluation drives us willing or not, into the issue of grades and grading. It is good to understand that conventional grading, stripped of all embellishments, can be practiced under two conflicting agendas.

1. **Grading as a means to express a measure of students' achievement of mastery of a defined set of skills or a body of knowledge based upon an absolute standard**

2. **Grading as a means to classify students into categories of relative status based on a relative standard**

Disparity between such agendas creates great difficulty when "good teaching" is evaluated for summative purposes. In the first case, "success" should ideally result in nearly all students mastering the material at a very high level, and thus class grades should be very high. In the second case, "success" should result in class grades with a bell-curve distribution, so that a few may fail and only a few will receive "A's." Case 2 is often called "grading on the curve." Most authorities advise against this, yet some units mandate it and choice is not an option for faculty in those units.

Each practice can be perverted, which leads to a need to justify what we claim to be success. High grades can result from good teaching; they can also result from low standards for achievement with little learning. A bell-curve distribution may arise from rigorous teaching; it can also be created by manipulations that range from poor teaching to mathematical forcing. Fair exams and grading is known to be an essential facet of successful teachers. To be sure that we are evaluating students fairly, we need some supplemental assessment in addition to tests and grades that helps us explain the meaning of the grades we give.

Good practices in grading include the following:

1. **The syllabus is the cornerstone. Divulge the true agenda and the kinds of evaluations that will be the basis for the grade. Give the definitions for each letter grade. The clearest definitions are numerical.**

2. **Continue with the syllabus by being very clear about any consequences to grades that will result from absences, missed tests and quizzes, late assignments, or violations of ethical conduct.**

3. **Keep students informed of their progress throughout the course. If a discrepancy exists between the grade a student thinks he or she has and the number in a grade book, resolve that discrepancy immediately. Spreadsheets can save lots of labor.**

4. **Once a policy is set, apply it equally to all students. Subjective adjustments during or after a course are likely to prove dangerous.**

5. **Validate evaluation with an alternative assessment of learning such as a pre-post test or knowledge survey.**

We're likely getting into danger if we find ourselves

1. **Testing on other than what we teach;**

2. **Grading on other than what we stated in our syllabi.;**

3. **Finding class grades to be unusually low and assuming no responsibility for this outcome;**

4. **Finding class grades are unusually high when our students don't do well on other measures of competency (i.e. - success in succeeding classes, results on standardized exams, results on departmental exams).**

Grading is communication to both students and to those who later review students. Grading has permanent consequences. Realize that later reviewers will not know what grading agenda was used, and opportunity to explain the meaning of a grade will rarely occur.

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Volume 5 Number 2 February, 1996

Evaluation of Our Students II—Multiple-Choice Tests

Attributes of good multiple-choice questions include: (a) a stem statement that presents a problem; (b) a correct option (the key) plus several incorrect options (the distractors); (c) an absence of irrelevant clues; (d) a presentation of the options in a logical order; (e) all of the above. **Correct answer: e!**

This format must sound familiar to anyone who has been through the American school system. In testing, multiple-choice items are the most widely used of the selection-type items, perhaps because multiple-choices can be used to test such a wide range of instructional objectives. Forty years ago, educator B. H. Bloom recognized six levels of learning presented in the sequence from lower to higher order thinking:

Knowledge—simply recalling factual material
Comprehension—understanding as displayed by ability to reorganize or restate material
Application—problem-solving or applying ideas and principles to deal with given situations
Analysis—separating ideas into component parts and recognizing how the parts are related
Synthesis—combining known ideas to yield a product that is new to the learner
Evaluation—using established standards or criteria to make judgements about the value or quality of ideas.

Multiple-choice items can be used to test all six levels, but the ease with which multiple-choice items can be constructed to test lower levels of thinking often leads to tests that address only these levels. This arises not from the inherent format of the multiple-choice test, but rather from the effort and level of thinking required to produce items that test high-level thinking in others. Construction of good multiple-choice tests begins with deciding the appropriate distribution of knowledge to test in a course. For beginning courses in which students lack even the basic vocabulary of the discipline, it may be reasonable to have a large portion of the test devoted to testing their acquisition of basic (albeit lower level) knowledge. Without a reasonable amount of basic knowledge and skills, it isn't reasonable to expect our students to do much high-level reasoning.

Some tips from experts on constructing good multiple-choice items follow.

(1) Write the stem so as to present a single, question or problem. Stems without verbs fail to present problems clearly. A closed stem may be a question such as "Which of the following...?" An open stem involves a sentence completion question with the blank at the end. An example would be: "Evidence that radon is a significant health hazard comes from..." Good practice in drafting multiple-choice questions places the blank ALWAYS at the end of the stem, never within it.

(2) Stems should be brief and convey the essential idea of the question. Stems are used for testing, not for teaching; two sentence stems that convey information first and then ask for responses violate good practice.

(3) In some formats, the examinee is required to pick an incorrect response from several correct responses. These are called "EXCEPT, NOT formats." When used, the writer should always write the word NOT or EXCEPT in capital letters to emphasize the true nature of the question. An example would be: "Which of the following is NOT an example of the passive voice?..." "LEAST, BEST or MOST formats" also require all caps of LEAST; *i.e.,* "The LEAST likely of the following materials to occur on the Moon is...."

(4) Options should be brief, of similar length, presented in a logical order, and no choice should be so absurd as to render an option useless for the testing of thinking or of content.

(5) All options should flow grammatically from the stem. If an item reads poorly, students' confusion will yield results that are not measures of actual knowledge.

References: Clegg, V. L., and Cashin, W. E., 1986, Improving multiple choice tests: IDEA Paper No. 16, KS State University. Educational Testing Service, 1994, Developing good multiple-choice test questions: Princeton, ETS. Jacobs, L. C., and Chase, C. I., 1992, *Developing and Using Tests Effectively*: San Francisco, Jossey-Bass.

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Volume 5 Number 3 March, 1996

Evaluation of Students III—Processing Multiple-Choice Tests

Although multiple-choice tests take more time to author, the time savings occurs when the special answer sheets can be machine-graded. On this campus, machine-grading available to instructors through the Office of Teaching Effectiveness provides several conveniences. The tabular output (Figure 1) includes students' names arranged alphabetically, raw score based on the number of questions, class percentile and rank, percent of questions answered correctly and percent of any questions left blank. When processed, this file can be downloaded directly from the computer into a spreadsheet, which allows those faculty who use spreadsheets for grade books to simply copy the desired data without having to retype it.

NAME	SCORE/40	PERCENTILE	RANK	% CORRECT	% BLANK
A--	33.00	84	5	82	0
B--	20.00	5	37	50	0
C--	31.00	71	9	77	0
D--	24.00	29	25	60	0
E--	26.00	39	23	65	0
F--	23.00	18	29	57	0

Figure 1. Abbreviated version of tabular output of student grade results.

Test processing requires input from a test key that is drafted by the instructor and run through the scanner as the first page. Because mistakes can occur in marking a key, a check is provided by incorporating a summary analysis (Figure 2) that shows the overall test results and whether an abnormally high number of students missed any one question. This permits an instructor to re-examine the key. If need be, the key can be corrected and the tests immediately reprocessed. A detailed question analysis (Figure 3) allows the instructor to see the distribution of correct and incorrect responses to each question. Multiple choice tests should have only one correct response, and test analysis software packages permit only one. If the question analysis reveals a high proportion of students responding to an incorrect choice, the instructor will wish to check the question to see if more than one correct choice was provided accidentally.

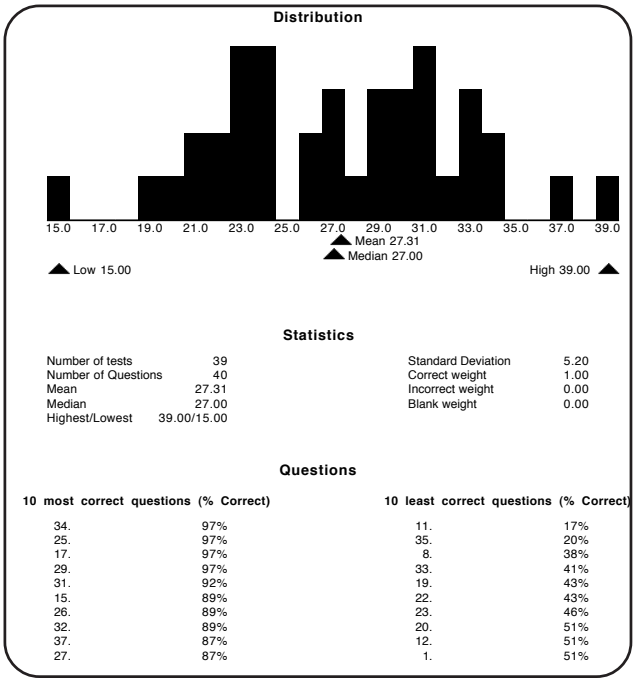

Figure 2. Summary of statistics of test processing.

Question	%Corr.	%Inc.	%Blank	%1	%2	%3	%4	%5
1.	51	48	0	2	7	12	**51**	25
2.	53	43	2	2	7	12	**53**	20
3.	69	30	0	5	7	10	**69**	7
4.	79	20	0	**79**	10	7	2	0
5.	66	33	0	**66**	2	15	5	10
6.	66	33	0	0	30	**66**	2	0
7.	53	46	0	15	28	2	**53**	0
8.	38	61	0	10	0	7	43	**38**
9.	82	17	0	2	0	**82**	0	15
10.	84	15	0	2	**84**	0	12	0

Figure 3. Question analysis shows how students responded to each question through its five options. Correct response options to each question are displayed in bold-face.

Our UCD scanner has an ink read head that requires special forms but allows students to use pen or pencil for responses. Faculty can operate the scanner themselves, so there is no waiting for processing. For access, contact this office by phone or by E-mail.

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Volume 5 Number 4 April, 1996

Evaluation of Our Students IV - Essay Tests

The essay test is probably the one faculty use most. At the very least, its strengths include low consumption of time to construct the exam and low consumption of office resources. (Multiple choice tests can require a lot of paper and Xeroxing.) More importantly, essay questions can probe depth of knowledge far more effectively than multiple choice questions. After all, the responses on a multiple choice question are limited to the options we provide, so a short-answer test is prone to being a measure of "Do you know what I know?" If a student gleans more information from journals or the World Wide Web than we present in class, a multiple choice exam will never admit that knowledge.

Essay responses allow us to see our students' thought processes that lead to the answers. We may be testing at some higher level of Bloom's taxonomy of thinking—perhaps within the level of synthesis—but discover in a student's answer that he/she lacked the knowledge required to begin synthesis. For example, consider the topic of asbestos, tested by essay at sequentially higher levels of reasoning as described by Bloom's taxonomy (levels in all capital letters).

1. What is asbestos? (KNOWLEDGE)

2. Explain how the physical characteristics of crocidolite asbestos might make it conducive to producing lung damage. (COMPREHENSION)

3. Consider the crystal structures of chrysotile and crocidolite. Why should the most common mineral be the less hazardous? (APPLICATION)

4. Two controversies surround the "asbestos hazard": (1) it's nothing more than a costly bureaucratic creation or (2) it is a hazard that accounts for tens of thousands of deaths annually. What is the basis for each argument? (ANALYSIS)

5. Design a study to reasonably demonstrate the dangers posed by asbestos to the general populace. (SYNTHESIS)

6. Which of the two controversial arguments in Q. 4 above has the best scientific support? (EVALUATION)

When one sees the topic tested at all levels, one realizes that increasing amounts and depth of content knowledge are needed before one can use the higher levels of reasoning described by Bloom. How a student answers such questions allows us to discover the reasoning that students use to produce answers. All of these essay questions could be restated in multiple choice format, but that format provides no way to determine *how* or *why* a student made a given choice.

There are also disadvantages to essay tests. The time spent in authoring a test may be small, but the time spent in grading it is often immense. Differences in students' language skills or speeds of composing an answer can produce different test results from students with similar mastery of content and intellectual reasoning abilities. Grades on essay tests also lack consistence; it is easy to catch oneself using different criteria to grade the same question after one has read a number of test answers. Essay answers require time to produce, which may preclude testing of much breadth of knowledge. Assessing both breadth and depth of knowledge may require a combination of essay and short answer testing.

Success is helped by carefully constructing questions and adhering to criteria that we provide in writing for ourselves. Testing should not be an add-on event performed after teaching. Rather, the best time to compose an essay question is BEFORE presenting the material. If, at that time, we formulate the question and the criteria we will use to grade it, we then know exactly where we are going with our instruction, and we will more likely teach the criteria completely. When drafting the test, we need to accurately estimate the time that it may take non-native speakers or methodical thinkers in our classes to craft respectable answers. Consistence is aided by grading the entire set of exams one question at a time. Using an empty lab or conference room with large tables allows us to lay out all the exams to a single question and to move rapidly among them. Moving keeps us from fatigue, and this system helps us to retain the same criteria in mind as we evaluate the answers.

(See survey results, back of this page!)

HIGHLIGHTS of Technology Survey Results

Kudos to those who responded to the 100-question survey on use of technology! The survey obtained over 420 responses, with CU-Denver producing the highest response rate (Congratulations!). Agreement between the respondents from all four campuses was exceptional (see graph below) despite the very different missions at each. Items 1-30 focused on current use, and intensity of use decreases generally from office use to class-prep to in-class use. We rely most heavily on word processing, E-mail and Internet, and our least-used technology is authoring software for multi-media presentations and CD-ROM materials. A much smaller group of professors currently teach distance learning classes (items 31-40). These instructors tend to use standard AV materials such as overheads, slides and videos and to make good use of E-mail to aid their contact with students.

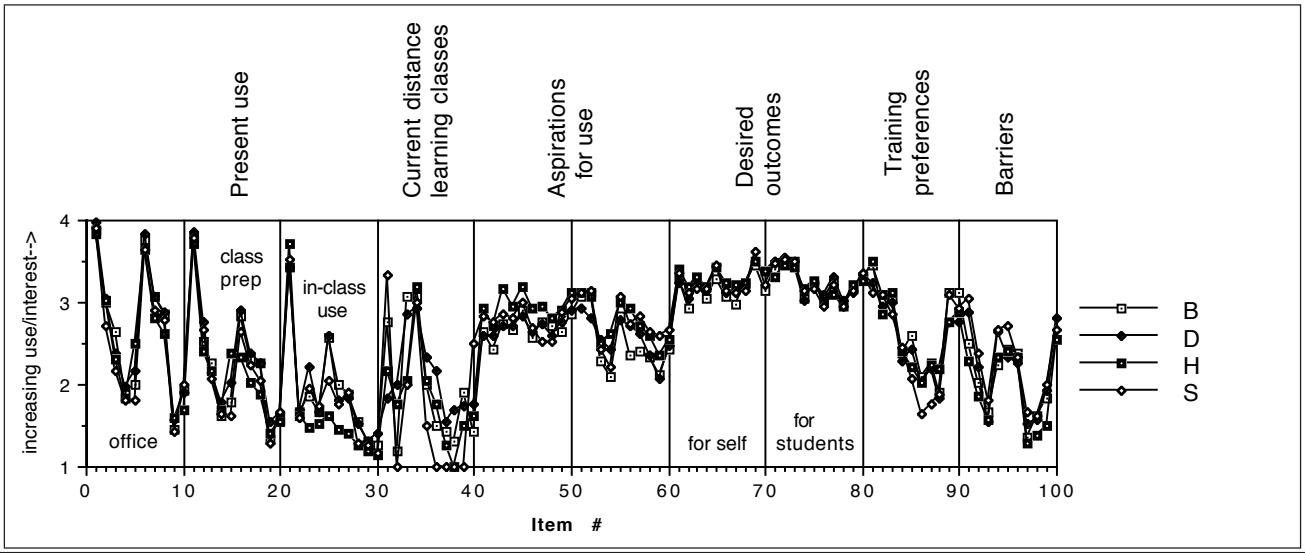
Faculty are pragmatic in the areas in which they want to increase their skills (items 41-60). Drawing programs to produce visual aids, presentation software, using the web, and obtaining ancillary materials on CD ROM are the technologies in which faculty have the greatest interests.

Of lower interest to faculty are multi-media used for student in-class presentations and providing entire distance-learning courses. To place this in perspective, however, note that all aspirations for use (items 41-60) are high, and "lower interest" in the latter case translates into over 140 faculty with high to moderate interest in creating a distance-learning course.

The areas of highest interest (items 71-80) fall mainly under the area of good teaching practices. For themselves, faculty most want to know how to choose technology that is appropriate for their classes, how to use technology to promote active learning, and to have a support network on campus to help them in their utilization. Faculty most want students to know the information systems of their disciplines, to be able to think critically in order to make good use of information, and to be satisfied with their learning experiences.

Faculty prefer training from: (1) a technology office established on their own campus, (2) summer workshops lasting several days, (3) occasional 1-day intensive workshops, and (4) workshops provided to their own individual departments. They least favor training through formal courses and teleconferences.

The primary barriers faculty perceive (items 91-100) are (1) lack of classrooms that are fit to teach in with technology (an explanation for the trend noted in items 1-30), (2) concerns for inequities of access to technology among students as courses increasingly assume student access to computers and (3) lack of time to learn new technology. Less than 1% of respondents noted fear of technology as an agent that could lower student evaluations as a serious barrier, thus relegating this "barrier" to the status of a non-issue. Overall, faculty interest is high in learning the opportunities provided by newer technologies. The survey revealed what faculty now use, what they aspire to use, what outcomes they wish to have occur, how they want to be trained, and what barriers prevent them from meeting their aspirations. These results allow us to use the 1196 grant money to address the concerns that faculty have defined, and it is likely to be money very well spent.



(See newsletter, back of this page!)

NUTSHELL NOTES

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Volume 5 Number 5 September, 1996

Of Beggars, Wealth, Technology, and Teaching

CU ON-LINE, INFORMATION SYSTEMS, EDUTAINMENT, CD-ROMS, NETS, HYPERMEDIA, WEBS, PRESENTATION SOFTWARE, DISTANCE LEARNING, and finally **WESTERN GOVERNORS VIRTUAL UNIVERSITY**—Holy Cow!! What could such things have to do with my teaching? A lot! The UCl Teaching Committee chose *Teaching and Technolog* as this year's theme of focus, with the hope that as mai of us as possible will be able to answer that questior

Most of us are aware of some past innovations th were championed by those who promised "bette education through hardware—*'more teaching–fewer teachers; self-paced learning at the convenience of t student; doing more with less'*—all jingles that have familiar equivalents to claims for modern technolog Through the test of time, such touted innovations prov to be embraced more in land-fills than in universitie But it is dangerous to delude ourselves with any attituc that "this too shall pass" regarding instructiona technology. Current technology will indeed not pa quietly without transforming what we do. Pas innovations such as teaching machines were seldor seen outside of a few lab classrooms. They were n common department store items nor was inability use one likely to prove any handicap in access information or to prospects for employment. Seve terms above, however, refer to things that are broad embraced by a public that has already made the co benefit decision to use technology—in governme agencies, private businesses, and homes. The train ha left the station; some instructors are on it, some are nc but the world their graduates enter has been, for bett or worse, permanently changed . We have an obligatic to prepare students for the present and future rather th for the past, and this is one reason that instruction technology is not something we can ignore.

An equally valid reason to become knowledgeab about instructional technology lies in the fact that no of the italicized jingles emphasizes good teaching quality education. Such statements indicate a confusi of cheaply processing students with truly educating them. If we do not explore the strengths and limits of instructional technology, we may find it difficult to advocate effectively for educating over processing. *Nutshell Notes* deals primarily with good teaching practices, so let's begin this year by recognizing that teaching, learning, and thinking are all fundamental aspects of education—technology is not. It is simply a tool that can help us deliver and promote the fundamental aspects. In application, this implies priorities: *i.e.* **when selecting technology, learning how to make the technology deliver the teaching we believe is best,** rather than **letting the technology dictate that we teach in ways we suspect are second-best.** Faculty are the experts in educating for their disciplines. Employing the tools of technology should not mean yielding faculty choices in teaching, learning, or thinking to the designers or advocates of mere tools.

Yet, the only true choices are informed ones. An elderly Eastern Indian sage said: "A beggar cannot renounce wealth"—a most poignant statement! Suppose that our chosen teaching style involves active learning rather than passive note-taking from lectures, and that we are confronted with the opportunity of offering a telecourse. None of us has failed to hear the medium, television, associated with the label "passivity." But rejecting a telecourse medium out-of-hand because "it's passive" may mean that we simply failed to investigate its potential. Equally bad is allowing ourselves to be coerced into only lecturing—letting the tool drive us to teach in ways other than those to which we aspire. Unless we have awareness, either "choice" simply becomes analogous to a beggar claiming to renounce wealth. Instead, we could study Tom Cyrs' (NM State University) list of 99 ways to make a telecourse interactive, and then make a more informed choice in whether to accept or reject the opportunity.

Should we employ modern technology in our teaching? Not necessarily—the answer varies with each of us. Should each of us learn what technology can provide to enhance her/his teaching? **Absolutely!**

(See back of this page for important announcements.)

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Volume 5 Number 6 October, 1996

Instructional Technology & *The Seven Principles of Good Practice

1. Good Practice Encourages Student - Faculty Contact.

Frequent student - faculty contact in and out of classes is the most important factor in student motivation and involvement. Technology can indeed be used to build another bridge for this contact. E-mail and conferencing software increase opportunities for students and faculty to interact through the entire learning process. Shy students who are reluctant to speak up in class often find that electronic communication from their homes is less intimidating than disclosure in front of an entire class.

2. Good Practice Encourages Cooperation Among Students.

Much learning is enhanced when it is experienced through team effort. Sharing one's own ideas and responding to others' reactions improves thinking and deepens understanding. E-mail clearly overcomes the limitations of schedules and space and allows an extensive cooperation between students without any requirement that they be in the same place at the same time.

3. Good Practice Encourages Active Learning.

Research shows that doing is important to learning. Learning is enhanced when students write about material, discuss it, and/or apply it. Technology provides opportunity for students to grapple with material and manipulate it, answering their own "What if...?" queries. Through technology, students can team-revise and edit a manuscript, compose music, see the results of varying chosen parameters in equations, and do simulated experiments in virtual laboratories where assembly of components and effects of changing component settings can be learned prior to dealing with the actual physical equipment.

4. Good Practice Gives Prompt Feedback.

Students need appropriate feedback on their performance. Technology allows students constant opportunities to perform and receive suggestions for improvement. Computers can store, organize, and provide quick access to student work, which can serve as a record of each student's improvement and intellectual growth.

5. Good Practice Emphasizes Time on Task.

Learning takes time, and it's not simply a question of amount of time but also *the degree to which one is engaged* during the time spent. Some professors have combined electronic gaming with content as a special way to make time spent particularly engaging. Technology now permits students and teachers to interact without spending hours in commuting and can provide a cumulative record of student participation and interaction in a course. Electronic access now allows a search for key literature through many libraries to be completed in less time than it takes to commute to a single library.

6. Good Practice Communicates High Expectations.

Technology provides ways to enact high standards. Assignments can be widely distributed for review and peer evaluation. In some courses, written assignments are peer evaluated by students taking the same course at another university. Broad evaluation strengthens the peer review process. Rationalizing poor performance by blaming one professor is difficult under such conditions. Shared learning challenges help develop high level cognitive skills and an ability to distinguish between excellent and average work.

7. Good Practice Respects Diverse Ways of Learning.

There are many roads to learning, and also many ways to build roads with technology. At the cutting edge are professors like Curt Carver of West Point, who use technology to allow students to assess their own learning styles and then have the content material delivered from a server—customized to each individual's preferred learning style. Self-reflection, visualization, collaboration, and individual pacing can all be incorporated into a course through use of current technology.

***The Seven Principles for Good Practice were compiled in 1987 (Wingspread, v. 9, pp. 1-8) and have probably been quoted more often than any short synopsis of "teaching tips." This month (AAHE Bull., Oct. 1996, v. 49, n. 2, pp. 3-6) some authors of the original article revisited their Principles and evaluated how they apply to use of instructional technology. This note is taken partially from that source.**

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Volume 5 Number 7 November, 1996

The Many Uses of E-Mail

(written primarily by James J. O' Donnell, Pennsylvania State University)*

There are plenty of uses for e-mail lists. (A) Keeping yourself informed—you can often find places where your students will be excited, stimulated, and instructed. (B) Introducing your graduate students to the buzzing world of discourse in an important field—writing messages to such a list is a good way for grad students to begin to "speak up" in scholarly conversation, make relatively non-toxic mistakes, be corrected, learn from and mentors they may never otherwise meet.. (C) Showing undergraduates the excitement of discourse—they can listen in on the ongoing conversations of more senior scholars and begin to be aware of current issues .

Learning to manage e-mail relations with students is much like learning how to manage relations with live students. The challenge comes when the new medium seems to shift the balance toward informality, intimacy, and play. Luckily, it is easy to ignore the inappropriate message, and your students will soon enough get a sense of how often you can be expected to respond, at what hours, and in what tone.

If you require students to have accounts and participate, you can then think of ways to transfer some discussion from the classroom to the e-mail list. This can be particularly useful in very large courses where discussion in the classroom is hard to begin and sustain.

Several faculty have found it useful to require students to submit written work to be read by the whole class, designing such exercises into the term schedule. Written exercises that respond to other students' writing are particularly valuable. In this way, the act of "writing a paper" becomes a real exercise in communicating with one's peers. If a respondent misreads a student's paper, the author of the original paper then has a precious new motivation for improving his or her work—to get through to a real live audience. The teacher in this situation becomes a collaborator, not a judge.

Bringing some discussions onto the network makes it possible to link different classrooms of students. If a Shakespeare literature course and a drama course were going on simultaneously, those two groups of students could be reading similar material and discussing it by e-mail.

Instructors with TA's can use e-mail for management and coordination. Each TA in a large course could have his/her own list for contact with students; but there should also be one large list common to the course. The senior instructor can monitor the list, see the most frequently asked questions, and adjust plans for spending class time accordingly.

There are thousands of discussion lists all over the world, covering a myriad of topics. Some are of quite high quality and interest. One of author Jim O' Donnell's favorites is CLASSICS, MEDTEXTL (medieval literary/textual studies). For Renaissance students, there's FICINO, for French literature BALZAC-L; there are many history lists. There's a list associated with the ongoing on-line collection of ancient and medieval texts dealing with music and music theory run by Thomas Mathiesen at Indiana. Explore the options!

***Because I'm lazy on a foggy day, for the first time I decided to largely steal a *Nutshell Note* from the World Wide Web rather than write one from scratch. *I can morally justify this* through the excuse I'm demonstrating the value of the net and web—the theme of this issue!**

This is the first *Nutshell Note* with an assignment! To learn a lot from the professor whom I stole this from, visit http://ccat.sas.upenn.edu/jod/jod.html, and look at *New Tools for Teaching*. Are you able to provide your students with resources comparable to those in the courses of this Professor of Classics? Now, if you've read this small print, turn over this page to learn how you can win a prize. Best wishes! Ed Nuhfer

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Volume 5 Number 8 December, 1996

Winning WEB Sites Used by UCD Instructors

The professors named in the following paragraphs are beneficiaries of reading the fine print in the last issue of *Nutshell Notes*. The purpose of the "Web Page Awareness Contest" was to discover what resources early adapters are using and to allow others to see why these are indeed useful.

Julie Henry (education) recommends the Association for Childhood Education International at **http://www.udel.edu/bateman/acei/**. Julie says: "This site has many resources, but the one that I find of particular help is the Education Resource Catalog. This catalog contains position papers that ... make terrific resources for classroom education. This page also provides information on speakers bureaus, media contacts, awards and grants and publishing opportunities. This is an excellent resource for anyone in education."

Clyde Zaidins of Physics likes **"**Eric's Treasure Trove of Physics" found at the long address of **http://www.astro.virginia.edu/~eww6n/physics/physics.html**. He notes this site as "a very good encyclopedia resource for physics students." It also has links to other disciplines.

Peggy Lore nominated Chinese American History Timeline found at **http://www.itp.berkeley.edu/~asam121/timeline.html**. From Peggy: "This site provides significant dates, text of judicial cases and legislative documents that have impacted Chinese Americans in their striving to become members of U.S. society. Where else can you find out information about Asian immigration on Angel Island, see pictures of the San Francisco earthquake and get a copy of the 1868 Burlingame-Seward Treaty on the same WEB site? "

Fred Chambers, Geography, says: "I would like to promote the site '**www.usgs.gov**', which I suggest to students in 'Natural Hazards.' This site leads to a VAST amount of information and graphics on earthquakes, volcanoes, and floods. Links provide both historical and current data (e.g. Mt. St. Helens and imagery of the current Mt. Pavlov eruption). Student response has been incredible, with many bringing in reprints of material gleaned from the site."

Blandine M. Sevier of Modern Languages states: "In my opinion the following web site is the best there is for teachers and students of French, because it provides all kinds of useful links to explore French culture on the net (American as well as French links). Really amazing!" See this at **http://www.utsa.edu/aatf**.

Marty Humphrey (Computing Science & Engineering) recommends that his students use the resources of The Center for the New Engineer found at **http://www.cne.gmu.edu/modules/modules.html.** In addition to other useful things, the site includes actual tutoring modules "complete with text, animated demonstrations, quizzes, and links to other related pages. These modules allow easy, interesting, self-paced, 'nonlinear' learning."

Helen Petach of Chemistry finds the "World-Wide Web Virtual Library: Chemistry" at **www.chem.ucla.edu/chempointers.html**, to be especially useful. Helen describes this site as "a comprehensive library of every university chemistry web site around the world (and includes government sites in the U.S.). Click on any university name and get information on such topics as: (1) chemistry demonstrations (Brigham Young University) (2) pictures of 3D molecules (Brookhaven National Labs) or (3) faculty research interests (important for students looking into grad school)."

Psychology's Rick Gardner likes "Psych Web" at **http://www.gasou.edu/psychweb/psychweb.htm**. Rick notes this as "an excellent meta-index both for teachers of psychology and for students studying psychology. Numerous teaching tips for psychology teachers on planning curricula. Numerous sites are sorted by topic, including commercial pages, on-line journals, directories, and search tools. Chat rooms for discussions are included and the page is regularly updated."

The grand winner comes from May Lowry (Education). Her nomination for "amazing web site" is the "World Lecture Hall" at **http://www.utexas.edu/world/lecture**. From May: "This site is a must visit for faculty members who are planning to use the web as an instructional tool. It includes syllabi, assignments, lecture notes, exams, and activities from on-line courses in 91 disciplines from Accounting to Zoology." Many of the web sites recommended above can be found through starting at this final site and following links. **If there is any doubt in your mind about the usefulness or impact of the WEB in the instruction of your discipline, go to this site, look up your discipline, and see what is available to students in your field—exciting and sobering!!**

HAPPY HOLIDAYS!!

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(See back of this page for important announcement on spring seminar.)

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Volume 5 Number 9 December, 1996

Happy Holidays!

Best Wishes for the New Year!

Integrating Teaching and Service at the New Urban University

Frank Ford, Colorado Center For Community Development (CCCD)

This issue provides information about a respected and successful UCD Office that many of us have not explored. Opportunities do abound here, and making contact is truly worthwhile.

Why do community service?

Teaching Aids: Community service projects are valuable teaching tools. Like most of us, students tend to internalize learning in a more meaningful way when they're able to experience theory in terms of application to real events. For faculty, community projects provide fertile ground for research and publication through case studies and surveys. Enterprising faculty find the connections they make through community projects may lead to further consulting.

Finding a project or other opportunity

Faculty wishing to identify a project or field placement agency may contact CCCD. This UCD office has 27 years experience with most rural and urban communities as well as non-profit and government agencies in the Front Range area.

Tips for integrating service and teaching

Expectations - Be clear with students about your expectations: how many hours per week they are expected to work at their field placement, what issues they should be analyzing, the nature of any work product, if any. These expectations should be included in your syllabus. Interested faculty may contact CCCD for a sample syllabus. It's equally important to be clear with placement agencies about all expectations—theirs, yours, and the students'.

Be Aware of Students' Limitations - If you require students to do community service work, the hours you expect them to spend engaged in outside reading, writing or research must be adjusted accordingly. Nine (9) hours per-week of outside work would normally be expected for a three (3) credit hour course. If four hours per week of community service is expected, this would leave a balance of only five hours weekly available for reading, *etc*.

Community Service Contract - Use a simple one page contract, signed by you, the student and a representative of the placement agency, which will spell out the above expectations and limitations. CCCD has sample contracts.

Journals - Consider requiring a journal instead of a final paper. A journal that includes a significant level of analysis can serve as a substitute for a paper in providing a measure of what the student is learning. It is essential that students understand that the journal is more than a diary of events. Students must be given direction by the instructor as to the type of analysis that is expected. Consider giving students specific questions to address throughout the journal. Finally, because the journal is ongoing, consider having students turn in the journal at mid-semester for a review by you. In the event any key element is missing, your mid-semester comments can help re-direct their efforts prior to final submission.

Grading - You may want to base a percentage of the student's grade on their field placement performance. However, make sure this is clearly stated in the syllabus. When contacting the agency for an opinion of the student's performance, keep in mind that personalities can sometimes get in the way of an objective evaluation. If there appears to be a problem, discuss this with the student and balance the agency comments against the student's own opinion as well as the content of their journal.

A Final Word About Expertise

When dealing with social problems, and particularly urban problems, it is easy to fall into the habit of believing that only specialists have the knowledge needed to solve those problems. This belief pushes out the community resident who is indeed an expert at knowing what it means to live with community problems, and at knowing how the community works. Although these citizens may not have a college education, or even a high school diploma, their first hand daily experience and commitment to solving a problem may provide simple, workable solutions that professionals could miss. In the end, we and the communities we work with are better served by seeing our relationship as a partnership where each partner brings a different, but essential, ingredient to the problem solving process.

For further information, contact Frank Ford of CCCD at 556-2824.

(See back of this page for CU Online information.)

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Volume 6 Number 1 July, 1997

A Mid-summer "Howdy" with Some Announcements

Yes, yes--I know it is still summer, but some announcements needed to go forth so I decided to break tradition and do a summer issue of *NN*.

The survey on technology needs for faculty. Many of you filled out an e-mail survey for this office late last spring. Thanks to the Pathways Grant from CCHE & the President's Office, most of the major needs identified in that survey were met. Some materials are under late delivery, but take heart—they are coming. Another survey will go out again this coming year.

Lap-tops available for checkout. It's obvious that portable computers are the practical way to bring prepared materials to internet-wired classrooms. We matched Pathways with CINS funds & procured 10 PC and 5 Mac lap-tops that can be checked out to classes. Files from your office computer can easily be transferred to these via zip drives, which CINS also has. These lap-tops will be managed by CINS. To make reservations, contact Dallas Jensen at 556-4307. You might want to start this process now if you know your schedule.

Teaching Learning Technology Roundtable (TLTR): As result of Pathways and several other initiatives, we nearly workshopped ourselves to death last semester in technology training sessions. For that reason we held few TLTR spring gatherings. This year we have training needs, and also several important policy and service areas that should be addressed by faculty involvement. Included among these issues are the assessment and evaluation of distance learning and technology-based instruction, the valuation of time consumed by mastering new instructional technology (in the context of teaching-research-service), strengthening our ability to apply successfully for technology grants, establishing support networks for faculty in the form of training of a cadre of colleague-consultants to assist us at the departmental level, establishing a web-based "help-line," and bringing support services such as our Writing Center and tutoring services on-line. The TLTR groups are an excellent place to discuss and develop awareness about these needs. We are not seeking to create committee work. Rather we're looking to TLTR as a forum to view both problems and success stories and to hear recommendations for policies and support. We'll call an initial lunchtime meeting soon after classes begin. We want a core of interested participants , so if you wish to join this first event with a free lunch, please e-mail to enuhfer@carbon.cudenver.edu and you'll be notified.

Help on the way. On August 1, our new Coordinator for Instructional Technology, Carl Pletsch, will join the Office of Teaching Effectiveness. Carl comes from Miami University where he was an early and very succesful innovator at incorporating instructional technology into history courses. He was selected *via* a national search to spend two years as a visiting Research Professor at the USAF Academy, where he pursued research in networked learning at the Armstrong Laboratory. Carl retains his interest and activity in the discipline of history, so he also joins us as an Associate Professor in UCD's History Department. We are extremely lucky to have an individual who is both an excellent academic and an authority in use of instructional technology. Kudos to the Search Committee, the History Department, Chancellor Georgia Lesh-Laurie, Michael Murphy, CU System's Dave Groth, the TLE Initiiative, and others for support in making this possible for us—and WELCOME, Carl!!

Teaching in the New Urban University is the theme chosen for 1997-98 by the UCD Teaching Committee. This theme provides a golden opportunity to draw together past years' themes and to consider how the instructional needs of our unique university are best met in practice. We'll kick off the year with a fun event titled "The Teacher in the Movies" presented on August 29 (see back of this page) by James Rhem, editor and publisher of "National Teaching and Learning Forum."–ENJOY SUMMER!

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Volume 6 Number 2 November, 1997

Are CU-Denver Students "Different?"

A colleague from my former campus in Wisconsin (largely both undergraduate and residential) recently asked on an internet group: "All of my students (with the exception of a few high schoolers that take classes at the university) are adults...; where did this 'adult learner' label come from?"

"Adult learner" refers to people trying to fit in an education around adult lives, adult responsibilities, and adult problems that most young students living in dorms and attending a residential campus simply do not have, despite the fact that they are legally "adults." Concurrent lives of adult learners include ongoing career obligations, raising teenagers, caring for elderly parents and even dealing with job layoffs. At CU-Denver, we have both "adult learners" and younger undergraduates, and we have to serve classes that are mainly one, the other, or about equal mixes of both.

Traditional undergraduates on a resident campus can go back to their dorms or to the student lounges and work into wee hours of the night in study groups. Campuses that cater to night students won't have dorms or departmental spaces like a "chemistry lounge" where students can come together at all hours. Many of our students have other responsibilities that must be attended to, and they won't have all night and every weekend to devote to studies. One who teaches our students must pay attention to using class time *extremely* well and insuring that as much mastery of material as possible can take place *in class*. We have to be very well organized and know clearly what can be realistically assigned and what we must do during class time.

For the young undergraduate who may still lack clear visions of why they are in school, motivation is essential. On the other hand, when we work with "adult learners," motivation is a lesser problem. The latter have fit us into their busy lives on their own nickels, so they are already motivated. Most demand to be taught and to leave with tangible knowledge. They have a naturally serious bent because they, and often their families, sacrifice a lot to further their educations. In our classes, we have some students who may have more experience in a special topic that we are teaching than we do. This is not a situation to fear, but rather is one to celebrate! When we learn how to invite and use that expertise in an appropriate way, we can enrich ourselves and the whole class beyond anything we could do by ourselves with "traditional" students. Maybe the term "adult learner" is a poor word choice, but it certainly has profound implications.

Aside from the fact that we do face the teaching of different kinds of students than colleagues on more traditional campuses, both we and these colleagues often fail to appreciate the profound differences between faculty and students. Differences are demonstrated on the Myers-Briggs inventory, which describes approaches to socialization, (extroversion *vs.* introversion) gathering of information (sensing *vs.* intuition), decision-making (thinking *vs.* feeling), and evaluating information (judging *vs.* perceiving).

Myers-Briggs Contrasts

Myers-Briggs Category	Faculty	Students
Extroverted	46 %	70 %
Introverted	54 %	30%
Sensing	36 %	70%
Intuitive	64 %	30%
Thinking	50 %	50%
Feeling	50 %	50%
Judging	63%	55%
Perceiving	37%	45%

Faculty tend to be more inclined toward introversion, intuition, and judging than the general populace. Small wonder that we run into difficulty when we believe our students will happily learn material in the way we and our colleagues would learn it. Our students *are* different from other students—and from us too! How can we reach our diverse students? We can use multiple instructional methods to address the many needs that are present in our CU-Denver classes.

(See back of this page for important announcements--and some levity!)

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NUTSHELL NOTES

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Volume 6 Number 3 December, 1997

Addressing Diverse Learning Needs

In the last issue, we highlighted some ways in which our CU-Denver students are unique — they are different from the students in traditional universities, and they are different from us as faculty. All of us realize that "different" is not a synonym for "inept," but teachers who have students who don't respond well to the traditional lecture method tend to think of these students in similarly derogatory terms. Noted science educator, Sheila Tobias, titled her 1990 book on science teaching with: *They're Not Dumb, They're Different*... in deference to this tendency.

The fact that the traditional lecture method doesn't fit all students' needs does not mean we should cease lecturing! Some students (mainly those just like us) do indeed learn well from this method. However, it does mean that we need to use the lecture approach in better ways than the traditional mode of "telling it" *via* our non-stop talking for an entire period. In particular, we should make use of that research which reveals how people communicate, how they "know," how they learn, and how they best retain newly acquired knowledge. This research shows that *even those of us who learn well from lectures can learn the same material better and retain it longer when the material is delivered in multiple modes*. In general, the more senses we utilize when learning, the better our understanding and retention will be. Some of us can read and achieve what we feel is a good level of understanding. However, as we add hearing and pictures and graphics to mere reading, research shows that we will achieve better mastery and better retention. In particular, the modes that are most effective are those which give us a chance to grapple with material sufficiently to allow us to speak about it with others.

Consider the research* which begins with word learning as our "zero baseline." It shows that if we add visual and auditory and activities in which the student must speak, we get average improvements of between 69% and 90% in retention and comprehension! In particular, *we then reach those students whom we would not reach by lecturing alone*. Modes in which students actually grapple with material in class are referred to as "active learning" modes. They include a plethora of methods such as collaborative and cooperative learning, problem-based learning (see notice on back of this newsletter), in-class discussion of cases, group writing and critique exercises, even brief ten-minute lecture segments broken by an activity such as problem-solving or discussion. The variety these can take are well illustrated by Mel Silberman's book title, *Active Learning- 101 Strategies to Teach any Subject* (Allyn & Bacon, 1996). The different results of using active learning methods on course grades and retention is shown from the following table taken from one of Tony Grasha's recent teleconference workshops.

Traditional Lecture *vs.* Active Learning

Course Grade	Traditional	Active Learning
A	14.7%	43%
B	38.2%	32.7%
C	35.8%	22.1%
D	8.4%	0.9%
F	<0.4%	0.4%
Withdrawals	6.7%	3.1%

The above table also gives cause for reflection on the annual evaluations of faculty. In some units, classes with higher grades are looked upon with a jaundiced eye as "grade inflation." Elsewhere they are looked upon as good indicators of high student achievement. We know that student retention is important, and student retention in a course should be a dimension of teaching evaluation. At CU, we still fail to use, or even to gather, course retention data. During evaluation, we should be careful not to punish faculty for high student achievement, high retention, or good use of active learning techniques that can promote both.

*** For list of research references, attend the February 20 workshop with Tony Grasha! See back of this page.**

(See back of this page for important announcements!)

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Volume 6 Number 4 January, 1998

The Virtues of *VIRTUAL*

Within CU-Denver, we have a wonderful resource, easily accessible to students and faculty, termed *CU-Virtual*. *CU-Virtual* is conference software furnished through our own UCD CINS. The College of Education has long been familiar with this, because the shell for their "CEO" system is the same as that of *CU-Virtual*. After trying this for a semester in several applications, I am convinced that every UCD faculty, honorarium or teaching assistant should know how to use *CU-Virtual*. A good start is to set up a conference site for one of your smaller classes. If you are involved in significant scholarship such as being on a member of a national research team, heading up a multi-authored textbook project, or chairing a national or regional committee in your discipline, investigate how this resource can help you in your career. If you own a computer, you can have *Virtual* in about the time it takes to read this issue. Simply download the appropriate client version of *CU-Virtual* for your PC or Macintosh from the world-wide web by pointing your browser to **http://carbon.cudenver.edu/public/cins/virtual/download.html**.You can download *Virtual* both at home and office, and it doesn't require a powerful computer to run on.

You'll need to e-mail Monica Younger at **Monica_Younger@maroon.cudenver.edu** and ask her to give you a user name and password. Once you have them, *CU-Virtual* is usable. Help files are present, and the software requires little work to learn to use.

To set up a conference site, contact the same Monica Younger and give her the name of your course or research site. You'll need to furnish a list of names of those who should have access to your site (students in your class or people on your research team). They then obtain access to CU-Virtual in much the same way you did. Students who don't have home computers can still access their class conference site through the student lab computers. Based on the list that you furnished, Monica will arrange, within a day or so, access for them to the site, and assist them in troubles they may have in getting on. Monica takes care of thousands of users and she is a GEM--I've heard accolades about her helpfulness from new *Virtual* users from every possible source. You and your students/colleagues are in good hands.

Virtual is a superb instructional aid. It provides us with the ability to advise students, answer their questions, and it allows them to help one another—all without any commuting to appointments. It provides a new precedent for posting lecture notes and files. You won't have to stress your department's copy budget—simply post your notes and materials on the site where everyone in class can access them. If they lose the paper you handed out, it's there; if they miss a class, you won't have to address their need by carrying around past weeks' materials. If you make PowerPoint® presentations, you can also post these. Whatever you post, you can use *Virtual's* "History" function to see who read it and when. You can get, grade, and return assignments without any exchange of paper, and you can work individually with students in real time.

It can increase student involvement in countless ways. One example lies in getting students prepared for class. Suppose you assign "Chapter 3" for reading. You can also assign each student to make one review question per page of that chapter and post it to the "Chapter 3 Folder" at the class site. Next, you can tell each to get a colleague's review file, answer his/ her questions, then post responses back to the same folder. When you are ready to discuss "Chapter 3," these students are very ready because they have already read, grappled with, and discussed the material. You also have a clear record of who actually prepared and how. Experience with CU-Virtual develops skills needed for delivering a full on-line course, should you need to do that in the future.

For scholarly activities, *Virtual* seems to be an aid without parallel. "Attached" files travel unscathed without modification via *Virtual* and arrive ready to open without decoding. A manuscript can be worked over by several distant authors, each using a different color font, without need to resort to overnight mailings or conference calls. *Virtual* is a great asset!

(See back of this page for important announcements!)

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Volume 6 Number 5 March, 1998

Flashlight — A Flexible Feedback Tool

Flashlight is a bank of over 400 clearly worded, validated survey items that professors can choose from to assess the effects of instructional technology in courses and projects. *Flashlight* was developed through AAHE by testing the survey items at five different colleges and refining them through student and faculty focus groups. The items are available in "the toolbox" as files in standard word-processing formats. Most items are designed for "fill in the bubble" scaled responses, but open-ended questions and protocols for focus groups are also provided.

A beauty of *Flashlight* lies in the clarity and comprehensiveness of its items. One may get student perceptions on practically any aspect of his/her course and be reasonably confident that the students will interpret each item as expected. Most items elicit the students' evaluation of how particular technology affected the learning process. The professor simply selects items from the toolbox to build a custom survey tool. A few sample items written for a course using the World Wide Web (WWW) are given below. Each item is accompanied by an appropriate scaled response field (not shown here).

Because of the way this course used the WWW

- **I am better able to visualize the ideas and concepts taught**
- **I am encouraged to exercise my own creativity**
- **I am spending more time studying**
- **I am at a disadvantage because I do not possess adequate computer skills.**

Compared to a course that relied primarily on library research, how likely are you to

- **discuss ideas taught in this course with other students**
- **complete assignments on time**
- **apply what you are learning to "real world" problems?**

Banks of questions dealing directly with most technologies (e-mail, chat rooms, multimedia, televised lectures, WWW for distance learning, specific commercial software and even graphing calculators) are available. All items are also categorized by the pedagogical aspect they address. Some of these aspects are: active learning, engagement in learning, faculty-student interaction, time on task, and preparation for "real world" work.

Although primarily developed to assess the effects of technology on learning, *Flashlight* also has over 60 items that can be useful in standard classroom formats. These items provide information on the students' comfort with learning and on the extent of students' involvement in the course. A few sample items are given below. Again, each would be accompanied by an appropriate scaled (Lickert scale) response field.

To what extent were each of the following given priority in this course?

- **working in teams/groups**
- **providing detailed comments on assignments**
- **developing students' creativity**
- **learning to make study time more productive**

How frequently have you

- **discussed ideas and concepts taught in this course with other students**
- **worked on optional tasks for this course**
- **applied what you have learned in this course to other courses**
- **discussed what you are learning with the instructor?**

A site license for *Flashlight* has been purchased for all CU faculty and instructional staff. You can get a user's manual from UCD's Office of Teaching Effectiveness (address on masthead above) and you can download the entire *Flashlight* toolbox to your computer from CU-Virtual by making a request to Monica_Younger@maroon.cudenver.edu. ENJOY!

PAVELICH and PIZZA

Join us on Thursday, April 16 from noon-1:30, at CU-Building 14th & Larimer, Executive Programs Suite, when guest speaker Dr. Michael Pavelich from Colorado School of Mines will present ***Mentoring Students to Higher–Level Thinking,*** which includes the exciting results from their recent research. To reserve space & pizza, e-mail enuhfer@carbon.cudenver.edu.

(See back of this page for important announcements!)

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Volume 6 Number 6 Undated

Nutshell Notes Volume 6 Number 6 has been the home page for Boot Camp for Profs® since 1998. It is updated annually. Use a web search engine to find the current year's program

(See back of this page for important announcements!)

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Volume 6 Number 7 September, 1998

Learning Students' Names

That time of year again— we are in a room full of new students who want to feel they are recognized and valued as individuals—how can we learn their names? Knowing students helps to improve the classroom climate, and at UCD, a place without a student directory, the introductions we provide may indeed be the main method of building a learning community. Yet, it is a tough task, especially when students move from seat to seat on different days in a large class. Here are some helpful tools.

1. Tell students you want to learn their names, but it is difficult to do so when they change seats or sit way in the back. Ask the class to fill empty spots in the front of the room and retain their seat in order to help you.

2. Have students give their name each time before they speak, and use students' names as often as possible.

3. Have students make name cards on the first days of class. Index cards work well for this. On the card students can write the name they prefer to be called in class. Below their name they can write one sentence which will make them memorable. Collect the cards at the end of the class. Hand out the cards at the beginning of the next few classes, while reading the traits out loud to the class. As note cards are handed out, learn the face of the student associated with the name. Pass just a few cards back each period and become familiar gradually with your class.

4. Strive to just learn a row of students' names each session. Realize that you can best learn just a few names at a time.

5. Have students pair up and introduce themselves to a partner. Tell the pairs that their "test" will be to introduce their partner with "a trait that none of us can forget." At times stop the introductions, point to each introduced student, and ask the class to recall the names of all the students thus far introduced.

6. Have students sit in a circle. Each student must say his/her name and give one identifiable characteristic. The next person has to give his/her name and characteristic, repeat what the person before him/her said, and recall preceding names. The person "unfortunate" enough to be last (perhaps the instructor) must recall all of those before him/her.

7. My favorite - A ball of kite string. Take the end of a ball of kite string and introduce yourself in a manner exemplary of how you would like students to introduce themselves. Toss the ball to a student while holding the end. The student who catches the ball does a self-introduction, then tosses the ball to another student at random. This process continues, with periodic reviews until the whole class is quite literally tied together! For review, the class members can pass the ball back, untangle themselves and talk about the person immediately before them. For instance, "I'm tossing the ball back to Allen. Remember that Allen cuts his own hair." The pattern continues until everyone in the class is disconnected.

8. Make up a sheet of off-the-wall traits (as many as there are people in the class) with blank lines beside them. Examples: "Is wearing shoes that don't require laces," "Likes spaghetti with clam sauce," or "Was born west of the Mississippi." This sheet is handed to every student. You and the students wander around the room, finding individuals with each trait, meet them and record their name. The one rule is that a student can use a person only once to complete his/her sheet.

9. Put students in groups of four. Then challenge the group to come up with five things they all have in common. Five is a number that will require some discussion to achieve. (If you require four things in common, each member may just choose one and present it on behalf of the group.) The one restriction is that the students can't use school- or work-related items. Personal items such as favorite music, books they've read, where they've traveled to, *etc*. work best. Walk to each group to learn a few names at each.

10. Extreme measure—If all else fails, take snapshots of all of your students (a student could take the photos). Place names on the back and learn name-face pairs as you would from flash cards. A collage of the class pictures can make nice office door decor too--very inviting for students.

Don't worry if you make a mistake (walking on water is not required in this life). Let students know that you may have trouble remembering their names. Most students will appreciate your efforts and will accommodate you.

(See back of this page for important announcements!)

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Volume 6 Number 8 September, 1998

Developing a Teaching System - Prelude

This is the first in a special series of *Nutshell Notes*. These are special because every issue will have a brief activity—each generating essential written reflections that will grow cumulatively into a teaching philosophy. We will then proceed further to develop an integrated teaching system built around your own philosophy. The outcomes you should anticipate will be (1) a generally improved practice of your teaching and (2) an unprecedented clarity in gearing up for reviews (RTP—Rank Tenure Promotion) or PTR (Post-Tenure Review).

*A successful **Teaching System** is enacted when a sound philosophy is applied with consistence through every action of our teaching. Further, a System contains specific self-tests and benchmarks that monitor the consistence of application.* The philosophy contains the core tenets we hold dear, and our Teaching System allows us to apply that philosophy with enough flexibility to best address the tasks at hand.

One of my core principles of practice in faculty development is to realize that faculty time is at a premium. This means I have to be confident that any activity that I involve your time in must be worthwhile in producing benefits. So, I have high confidence in this, so I'll ask you to participate by giving the activities a fair try. Later, if the final product doesn't prove worthwhile, tell me about it. This series is either going to produce a lot of benefit or leave me owing apologies to one and all!

We first must write a philosophy in order to have a blueprint for practice. A very normal response is "Why write it? Why not just do it?" To understand why, consider how a master carpenter or engineer, who is very adept at "doing," nevertheless must work from a blueprint or drafted plan. Teaching, like building, is a complex activity. Even for those who are exceptional at "doing," a written plan provides the clarity that promotes effective use of efforts to accomplish exactly what is wanted. Without such a plan, we have to clearly retain all aspects of the objective in our heads while we carry out detailed and perhaps difficult tasks—a risky approach to be sure! When we operate in that manner, we risk doing something that produces a result we do not want—a result that at best may require a "fix." Moreover, without a guiding philosophy, we may be unaware of specifically how we became diverted from our original intent and maybe started generating outcomes and reactions we did not intend.

This and the newsletters immediately following will help you to develop a written teaching philosophy. In order to retain continuity through this series, you'll need to make a file of these particular newsletters as we work through the process. Those with good paper filing practices can start keeping these in a folder. Others of us who tend not to deal well with paper filing can (a) refer to the web address below to copy the text to a word processor file where we can keep organized in our computers or (b) tape these to the back of your office door out of the usual circulating paper storm.

For our starting activity, simply flip this newsletter over. We are going to begin with some simple, but critical, reflections.

(Also see back of this page for important announcements!)

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DEVELOPING A SYSTEM- STEP 1

A. Reflect on your choice of career, and in one sentence express why you gravitated originally, toward becoming a university professor. Consider what generated the greatest enthusiasm for you, and what provided the core attraction(s).

B. Next, consider your present status and situation, and note any contrasts with your reflections in "A" above. What changes, if any, have occurred. Don't look for causes -just note "how things are;" consider what gives you satisfaction at this time and how that compares with when you began.

Don't Forget YUMPs !!

The next YUMPs (Young Upwardly Mobile Professors) activity is :
The RTP Process Revealed-- Departments, Primary Units, Colleges, etc.
Monday, October 5 and Tuesday, October 6
Noon-1:30 on both days
299 CU-Building (14th & Larimer)

Your Future Use of Computing at UCD

A *Strategic Vision for Academic and Administrative Computing* at CU-Denver has been developed by a very hard working Information Technology Policy Council. Two open forums remain to comment on the vision and ways to implement it.

Tuesday, September 29
10:00 - noon in GSPA Conference Room "C"
5th floor, Lawrence Street Center

Thursday, October 8
1-3 in Room 5018
North Classroom Building

Please phone Nancy at 6-3339 by Friday, September 11 and let us know which session you plan to attend.

The vision document can be found on the WEB at **www.cudenver.edu/public/ ITI/council.html**. Hard copies are also available in the Chancellor's office.

First TLTR of the Year!- With Lunch

Our first Teaching Learning Technology Roundtable (TLTR) will be on First-Class®-based conferencing systems CU-Virtual and CEO. If you use either for teaching, come prepared to share your experiences good & bad. If you don't use either, come listen and enjoy pizza with all of us. **noon, OCTOBER 21, Exec. MBA Suite 150 at CU-Building 14th & Larimer.**

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Volume 6 Number 9 October, 1998

Developing a Teaching System - 2

In our last issue we began to consider why we gravitated *originally*, toward becoming university professors, as contrasted with what *now* gives us satisfaction and affects our current enthusiasm.

These are important themes. The act of becoming a professor required a lot of time, money, and dedicated work, and we obviously wanted something special as a result. Perhaps that something may have been the excitement of working within an environment where ideas and creative thinking are encouraged and respected. Perhaps it was because of the desire to "make a difference" by helping or mentoring students who now struggle as we struggled. Perhaps it was because of an affinity for creating new knowledge through research, or perhaps we tried other professions and discovered we simply felt more alive on a campus than in any other place. Whatever aspirations and choices brought us here, we need to clearly know them. Our original aspirations are probably still important to our teaching success. Some things we should be accomplishing in our classes may well include what we wanted to do from the time we chose to become professors.

Research defines two important personality traits that aid success in teaching: enthusiasm and self-confidence (See NN v. 2 n. 4). It's hard to nurture these particular traits if we are not happy about the outcomes our efforts are producing. Doing well what we truly want to do is helpful to these two personality traits.

It is said that "change is the only thing that remains the same." Change is probably negative when it diminishes our self-confidence and enthusiasm. If we note our enthusiasm is becoming diminished, we should not accept that as trivial, inevitable, or irreversible. To do so may result in a transition from a career launched with fresh hopes and enthusiasm to a job that makes us bitter and cynical. If we sense a negative transition, then we should define, and next alter, the practices that are having damaging effects on us. For example, we may recognize that "university politics" are making us cynical and causing us to invest too much energy in worry about what others are doing and too little in what we could be doing. A solution may rest in reconcentrating our energies into more wholesome and *clearly defined* activities that will produce tangible, satisfying benefits.

Positive changes that occur after we became professors are associated with some personal growth. With time, we should have learned how to better integrate the three areas of teaching, research, and service to make them mutually supporting. We should find that we can offer more to students, simply because our knowledge, our professional contacts, and our opportunities have all grown. We might choose to concentrate either on teaching or on research because one brings us the greatest satisfaction at *this* time. We might get bored even with doing something well too many times, so we may change by developing a new expertise or even a new profession. If we see our choices can fit well within our institution, that is the best of all situations. If we see a poor fit developing between ourselves and an institution, we might wisely pursue a change to an institution with a better fit. However, without reflective thinking on such matters, we are not likely to see the best choices available. Therein lies the value of drafting a written philosophy.

Next we are going to examine some origins from which we got our own ideas about what constitutes "good teaching." The most common cliché in faculty development is "we teach as we were taught." Hopefully, each of us had inspirational role models in teachers, and they greatly influenced both our initial aspirations to teach and how we initially taught. Their influence may still be very great, even after we have taught for decades.

To pursue your origins a bit further, turn the page and complete the brief exercise. Save the results in your file, word processor or on your door--depending upon how you are following this series.

(Also see back of this page for important announcements!)

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Developing a Teaching System: Exercise 2 - Looking Toward Your Origins

1. Recall an influential teacher who had a very positive impact on you. Next visualize the setting that accompanies this memory. Below are some key words that others have used to describe their influential teacher. Pick the three that most apply to your former teacher, particularly in the special event you are remembering. If better terms seem to apply, write these below under "other" in the final three entries.

SOME KEY WORDS

accessible	focused
adventuresome	friendly
approachable	fun
authoritative	helpful
available	humorous
balanced	inspiring
caring	interesting
challenging	knowledgeable
clear	motivating
committed	neat
communicative	nurturing
competent	organized
concerned	patient
creative	personable
dedicated	prepared
demanding	professional
dignified	research - oriented
disciplined	respected
eccentric	respectful
effective	stimulating
encouraging	student - oriented
energetic	understanding
enthusiastic	warm
exciting	_____ (other 1)
expressive	_____ (other 2)
fair (just)	_____ (other 3)

Note below the setting in which the most memorable experience occurred. Was it in a small class, a large class, outside of class, a graduate course, high school, etc.?

_____

First TLTR of the Year!- With Lunch

RSVP to 64915 or enuhfer@carbon.cudenver.edu

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TELECONFERENCE!!

Creating Tomorrow's Learning-Centered Environments—Today!

"...perpetual learning as a fundamental assumption underlying the role of higher education..."

October 22, 10:30 a.m. - 12:30 p. m.

Media Center 008 Lower Level of Library Building (Use East Entrance)

Sponsored by Facilities Planning & Use and the Media Center --**RSVP 6-8376**

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Volume 6 Number 10 October, 1998

Developing a Teaching System - 3

First we considered why we gravitated *originally*, toward becoming university professors, and what *now* gives us satisfaction and affects our current enthusiasm. Second, we recalled an influential teacher and the setting in which our memory took place, and we tried to capture, in key words, the traits that made this person so memorable. In this issue we will examine our mentors' influence in the context of what we want to do.

On the back of this page, you'll find the same list of traits, but now you'll apply them to yourself. So **at this time flip the page and complete the brief exercise**, and then come back to finish reading this issue.

The traits you selected are core values for you. (These can change with time.) If you listed traits for yourself that you also listed (last issue) for your mentor, you likely affirm that mentor's influence as continuing to shine through in what you do today. For some of us, this influence has lasted for more than 30 years—we are recalling a profoundly formative moment of our lives.

In the last issue, you were asked to recall a setting in which your memory took place. When we do this exercise in the first day of Boot Camp for Profs®, a small percentage of respondents recall the event in a large class setting. The dominant number of memories are from a small class setting, and a substantial number take place outside a classroom altogether—perhaps in a professor's office, at a chance meeting walking across campus, or maybe even in one of those rare visits to a professor's home. Some recall a parent or pre-college teacher. With condolences to pioneers in instructional technology, no one has yet recalled "a most influential moment" as arising out of a web page or a videotape! Perhaps that will occur one day, but the current results indicate that the human element is very important to generating memorable moments. It reminds us that we are not teaching a subject, but rather that we are teaching people. So if we want to have positive influence on our students, we'll probably have to try to pay as much attention to them and as we do to our content.

Consider another question about your past mentor: "Do you think that this person realized the importance of that moment in your life—so much so that you would recall it years later?" Very few respondents give an affirmative answer to this. The lesson here lies in recognizing that moments and events we consider to be fairly routine or even mundane may not be either. As professors, any time we spend with a student might indeed translate into just such an important moment. We are influential to students, even when we are not in front of a class, and we always have power that we easily overlook. It carries quite a bit of responsibility to wield it with ever sharpening awareness.

So, should we "teach as we were taught?" We connected deeply with a particular mentor for a reason. Possibly we were like them or wanted to be like them. If so, and we emulate them too much, we risk reaching *only* the students who have our interests and possibly share our values. Most students are <u>not</u> like us (see *NN*, v.6, n. 2). This arises for several reasons, including the reality that a broader spectrum of a larger and increasingly diverse population now attends college. Aspirations and values do change with generations and more open admissions policies. The sharing of love for knowledge that worked for our mentor might not work as well in our classrooms where many students may be more concerned with "how to make a living" than "how to live." Ours may be a tougher job than our mentors had. Yet, we have more ways of delivering materials and more access to knowledge about pedagogy than was available to our mentors, so we can indeed grow beyond what they gave to us, as wonderful as their gifts may be. Key words that you provided for yourself that are not traits recalled for the mentor likely reflect your own growth—growth that should always be continued.

A final word: if your old mentor is still alive, <u>send her/him a thank-you card</u>. Any teacher is rewarded so very richly by being remembered in this way, and this is one of those rare chances to repay one good memorable moment with another!

Also see back of this page for important announcements!)

Past issues of *Nutshell Notes* are available at http://www.cudenver.edu/public/OTE/nn/index.htm

Developing a Teaching System: Part 3 - What traits are most important to you?

1. Below are some key words that others have used to describe influential teachers. Suppose at some unspecified time in the future, one of your students is doing a similar exercise and they recall you. Number in order of your priority, three traits that you would want your students to recall about you. If better terms than those provided apply, write these under "other" in the final three entries. Choose these carefully.

SOME KEY WORDS

accessible
adventuresome
approachable
authoritative
available
balanced
caring
challenging
clear
committed
communicative
competent
concerned
creative
dedicated
demanding
dignified
disciplined
eccentric
effective
encouraging
energetic
enthusiastic
exciting
expressive
fair (just)
focused
friendly
fun
helpful
humorous
inspiring
interesting
knowledgeable
motivating
neat
nurturing
organized
patient
personable
prepared
professional
research - oriented
respected
respectful
stimulating
student - oriented
understanding
warm
_____ (other 1)
_____ (other 2)
_____ (other 3)

First TLTR of the Year!- With Lunch

RSVP to 64915 or enuhfer@carbon.cudenver.edu

Our first Teaching Learning Technology Roundtable (TLTR) will be on First-Class®-based conferencing systems CU-Virtual and CEO. If you use either for teaching, come prepared to share your experiences good & bad. If you don't use either, come listen and enjoy pizza with all of us. **Noon, October 21, (Wed.) Exec. Suite 150 at CU-Building 14th & Larimer.**

TELECONFERENCE!!

Creating Tomorrow's Learning-Centered Environments—Today!

"...perpetual learning as a fundamental assumption underlying the role of higher education..."

Thursday, October 22, 10:30 a.m. - 12:30 p.m.
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Sponsored by Facilities Planning & Use and the Media Center --**RSVP 6-8376**

NUTSHELL NOTES

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Volume 6 Number 11 November, 1998

Developing a Teaching System - 4: "Alignment"

We considered *why* we became professors, and *what* now affects our enthusiasm, then we compared the *key traits* of a prominent mentor with those good traits for which we ourselves would like to be remembered. What we expressed in these prior exercises sits at the core of our basic professional values, which likely permeate most of our academic activities.

Now we'll turn to specifics that involve particular courses that we teach. For the remainder of this newsletter, focus on one course you teach or will be teaching next term. Pick a course which may be providing lesser satisfaction and generating some problems; dealing with this troublesome critter will likely provide benefits. We'll start by drafting the outcomes we want from the course. **Flip the page and perform the brief exercise,** then resume reading here.

We won't list the same desired outcomes for every course, although there may be some overlap arising from our strongest core values. One outcome we could want for students of a survey course may be a heightened interest that will transfer into lifelong learning. In contrast, inspiration for lifelong learning may not be a goal in courses that prepare students for professional practice. Applied outcomes—ability to pass a specific part of a state licensing exam or ability to use the acquired knowledge in practical ways, while mundane, could actually be more important in some courses.

S. A. Cohen (Educational Researcher, 1987, v. 16, n. 8. pp. 16-20) coined a term, *instructional alignment,* that is closely allied to development of a teaching system. Cohen's term refers to the degree to which intended outcomes, instructional processes and instructional assessment (testing) match with efforts to produce the outcomes. Cohen found that learning can often be improved by as much as two standard deviations by aligning the objectives with teaching and the evaluation! Further, such alignment demonstrated profound positive effects on what the researchers termed "low aptitude" college students, particularly on their succeeding in difficult tasks that require high level thinking. Cohen concluded that lack of excellence in classrooms was caused, not so much by ineffective teaching, but by a misalignment between what instructors intended to teach, what they actually taught, and what they tested. Misalignment is not the rare exception in classrooms; it remains common practice.

Alignment is characteristic of a developed teaching system. Our students need to know the instructional outcomes that we intend. Importance of overt disclosure of desired outcomes was recognized more than 35 years ago, yet it is amazing how seldom the needed communication takes place. One of the best places to begin to evaluate the status of communication in our own teaching system is at the syllabus. The syllabus introduces us and our course. *The specific values we have defined through our first three exercises, as well as the objectives we just expressed, should be obvious to a reader of our syllabus.* Suppose for instance that we chose to be remembered by a future student as an "ethical" professor, and as "a person who had genuine respect for students." A student reading our syllabus should clearly elucidate that "ethics" and "respect" are two key traits we esteem. A student should be able to list, after reading the syllabus for our subject course, the same three primary course objectives we just expressed on the reverse side of this newsletter. If a reader of our syllabus can't elucidate our core values and course objectives, then we don't even have a system. For now review your own syllabus to see if it conveys your intentions well. If it doesn't, make the needed changes. An acid test is to give your syllabus to a colleague and ask him or her to list, from the reading of it, three key words that reveal teaching traits you value highly, and your three main course objectives.

Finally, it is good to define one or two outcomes that we want for ourselves. Far from being merely selfish, this exercise provides an agenda for growth and renewal which benefits everyone. Without such an agenda, even repeated success will become boring.

Also see back of this page for important announcements!)

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Developing a Teaching System: Exercise 4
What outcomes do you want?

1. Consider one course that you teach now or will teach next semester. Draft three phrases that capture the three most important outcomes that you wish for your students from that course.

1 .

2 .

3 .

(Note: Our stated outcomes should not conflict with information given in official documents, such as catalog course descriptions, graduation requirements, or departmental brochures. We should convey our chosen outcomes to students, but if students receive conflicting agendas from the very documents they have been told to use and rely on, confusion and problems will almost certainly result. A noted conflict indicates a need for revision of either an instructor's objectives or of the formal documents.)

2. For the same course, draft two phrases that capture the outcomes you desire for yourself as result of your teaching the course.

1 .

2 .

3. Get a copy of the syllabus that you now use for this course, and return to finish newsletter on side 1.

Second TLTR of the Year!- With Lunch

RSVP to 64915 or enuhfer@carbon.cudenver.edu

Our next Teaching Learning Technology Roundtable (TLTR) will be on Web pages—templates for departmental pages and professional pages for individual faculty. This will be accompanied by brief demos of two competing products, *WebCT* and *CourseInfo* that can be used to develop web-based exercises for on-site or distance-learning courses. Come listen and enjoy pizza with all of us. **Noon, November 17, (Tuesday.) Exec. Suite 150 at CU-Building 14th & Larimer.**

Y2K Testing

From Jeannie Harder:
The Year 2000 and the infamous Y2K Millennium Bug are fast approaching. All personal computers on the CU-Denver campus should have been tested for Year 2000 compliance by now. If your computer has not been tested, please contact your area coordinator. A list of the CU-Denver Y2K Coordinators can be found on the web at http://www.cudenver.edu/public/y2k/coordinators.html.

On-Line Subscription to *National Teaching and Learning Forum*

We are experimenting here at CU-Denver with an on-line institutional subscription to National Teaching and Learning Forum. There are still some bugs in getting issues up here in a timely manner, but there is good information in this newsletter.
Look to the following url and browse a bit:
http://carbon.cudenver.edu/public/OTE/ntlf/
then let me know if this is useful at
enuhfer@carbon.cudenver.edu

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Volume 6 Number 12 November, 1998

Developing a Teaching System - 5: Alignment and a System

In our last issue, we introduced the concept of *alignment*. In alignment, we unify our efforts to produce intended outcomes through well-chosen instruction and assessment consistent with that instruction. We noted that the syllabus is an essential document to use to begin any course with communicating priorities to students. A teaching system is revealed by a good match between syllabus and a written philosophy.

A true teaching system is a *practiced teaching philosophy*. It is characterized by products and actions that are unified to produce stated priorities. If we state that "critical thinking is a priority outcome," then the majority of class meetings should have critical thinking exercises, and one should be able to look at our exams or projects and confirm that critical thinking is indeed the emphasis there also. When one has a true teaching system, an "annual review" becomes a clear exercise—we state our intended outcomes and demonstrate the degree to which we were successful in reaching them. We are free to be extremely innovative in our choice of actions to reach our objectives, but we'll be most successful if we clearly convey our system and intended outcomes to students from the start.

A common sequence is to (1) construct lesson plans and discussions to cover material, (2) to teach it, and (3) to create an exam or term project to assess whether students learned what we believed we taught. And sometimes we get confronted with results embodied in the statement: "I taught it, but they didn't learn it!"

Instructors with strong alignment don't follow this sequence. They typically write their exam questions based on selected outcomes *before* they construct lesson plans or teach. This sequence guarantees a close fit between what they teach, and what they *most* want students to learn. The challenge to "cover the material" is endemic to every course in every discipline; there is never any shortage of material. But merely "covering material" is a way to lose our primary outcomes. What we "cover" is not nearly so important as what students learn. Rather than cover just any material, students should reach prioritized outcomes that are of major importance. A good way to reach such outcomes is to consciously provide clear, consistent guidance through instructional alignment. This is true at the general philosophical level of the course. It is also true at the concrete level of every individual class meeting that transpires through the course. Now, try the concept of alignment for yourself in one of your courses.

(1) Look at the next unit you are going to teach, be it a day, week, or chapter. Write <u>at least</u> two <u>primary</u> learning outcomes that you want from this unit.

(2) Create an evaluation tool. Draft a list of test questions or problems that you will use to assess whether students achieved the designated outcomes. If you'll use another assessment tool—like a project or assignment rather than a test—draft a list of the key points you will use to evaluate success. Then arrange your list in the order in which you intend to present the material.

(3) Next, consider how to teach this material well. Decide on sequence and methods. Could you lecture briefly on a concept and pose each problem to the class for discussion or paired work, or could you teach the concept and provide a homework assignment due next period that allows students to grapple with the concept? Consider innovations, but choose what is comfortable for you.

(4) Disclose your desired outcomes and your chosen teaching method(s) to your students in writing before you begin the unit, <u>then</u> teach the material. Use the list you drafted in "2" above to keep your emphasis where you decided you wanted it. Good practice provides enough flexible time to respond well to relevant student questions, but take care not to allow your priorities to be sidetracked by coverage of less important material or by irrelevant discussions during class. Keep on task.

(5) Finally, evaluate student learning in accord with your intentions and your disclosure. Note the degree of success you found in using alignment as opposed to not paying so much attention to the concept.

Also see back of this page for important announcements!)

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Volume 7 Number 1 January, 1999

Launching a Teaching System - 1: A Higher-Level Syllabus

In the last five issues, we started building a teaching system based on: what we want to do through our teaching; why we emphasize certain approaches and objectives, and the need to clarify our desired outcomes to students. These all are critical ingredients of a stated teaching philosophy. We recognized that a *teaching system* is really the consistent practice of a sound philosophy. We concluded our last issue with the need to align our actions and course products in accord with our goals, and to disclose to students exactly what these goals are and how we intend to reach them. When we have a system based on our philosophy, we can outline a syllabus that will indeed focus us to help us do what we want and get the results we want. The syllabus is the first written document our students will receive, thus we begin to launch a system by getting students' awareness and interests aligned with our own.

1. YOUR SYSTEM DISCLOSED

You

- *Who you are--your core values--your key philosophy*

Your concerns for students

- *The outcomes you want for your students*
- *Your hopes why students will value this education*
- *Call to be made aware of students' special needs*

Your course content

- *Type of knowledge and abilities emphasized*
- *Why the course is organized in a particular sequence*
- *The objectives of the course and why you chose these as most important*
- *How the course relates to the content, primary concepts and principles of the overall discipline*

Your chosen pedagogy (ies)

- *If the course will be primarily lectures, discussions, group work, projects, etc.—describe your view of your responsibility for designing good use of class time*
- *How the knowledge will be acquired by the student—describe what you will expect students to do both in-class and as part of their outside responsibilities.*

Your assessment design

- *How you will assess if chosen outcomes have been met*
- *How this assessment will translate into any course grade*

2. ESSENTIAL LOGISTICAL INFORMATION

- *Your phone, e-mail, office number and office hours*
- *Textbook and/or outside materials needed*
- *List of required readings (insofar as known)*
- *Instructional technology requisites*
- *Pre-requisite courses or skills*
- *Policy for missed tests*
- *Policy for late work*
- *Policy for absences*
- *Policy for extra credit work*
- *Grading method and scale*

This design is unconventional because the usual logistical information comes later rather than at first. Indeed, the act of omitting one or more of the final six checked items is the start of the most common path into a dispute with a student that ends at a chair's or dean's desk. Do note the word "essential;" it means exactly that! But even more important than heading off a dispute with the occasional student is the need to start off your syllabus in a way that will help you get the vast majority of the class going the way you want it to go. If you want students to have passion for learning, you need to start with something more interesting than school policies! You and your aspirations for them are more interesting. The syllabus, in conjunction with its discussion on the first day of class, gives an opportunity to disclose your values, your enthusiasm, your interests, and to demonstrate them and involve your students in them. In the next couple of issues, we'll demonstrate how this structure will help you carry through on the course and then to demonstrate to the most skeptical of peers just how successful it was. Note well that *your syllabus starts with your teaching philosophy*—a document you can easily produce now, based on the past five newsletters. Draft it now, paste it above your desk, and consult it before you start every lesson plan and before you go to each class session.

Also see back of this page for important WORKSHOP announcements!)

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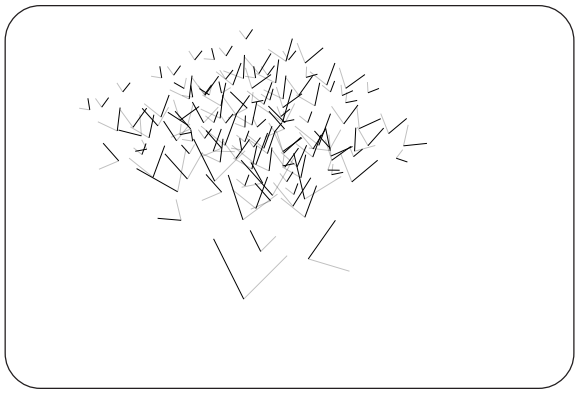
Volume 7 Number 2 February, 1999

Building a Teaching System - 2: Teaching in Fractal Patterns

In the last issue, we suggested that any syllabus is greatly improved if it is carefully based upon, and even includes critical excerpts from, the author's personal teaching philosophy. We concluded with the admonition to draft this philosophy, then to "paste it above your desk, and consult it before you start every lesson plan and before you go to each class session."

Some see teaching as "constructive chaos" in which varied activities contain an underlying purpose that not all students (or peer reviewers) easily see as associated with our learning objectives. Yet, once directed to look beyond limited personal experience (and perhaps our superficial "common sense"), it is possible to see "order in chaos" clearly and wonder why it wasn't seen earlier.

About ten years ago, the concept of fractals and implications of "chaos theory" reached the layperson via several popular books. Through them we learned to see order in natural objects such as clouds, trees or coastlines, which we formerly had considered as "irregular," "random" or as having no order. An example might be a winter view of a tree with its outline of leafless branches. At first it looks complex and devoid of order, but we also can see it as built of a variant of the letter "Y" connected repeatedly at different scales. Whether we view the entire tree, a branch, or the veins in a single leaf, the pattern is of the same kind no matter what scale we view it at. We recognize order in such shapes, and we now call such arrangements "fractal."



Granted, a trunk is a trunk, a big branch is a big branch, a twig is just that—all these entities are different, but within all is also a common shape—so consistent that it can be described by a number—a number mathematicians call the "fractal dimension" of the assemblage. In a teaching system, we may consider it good practice to possess an analogous order, like the assemblage of "Y" patterns into a tree. The basic "shape" disclosed in our teaching philosophy is what we build upon. Instead of physical objects, our basic pattern is developed out of our core values, concepts about learning, and priorities. If we have a true teaching system, our "shape" can be found consistently whether viewed on the global level of the semester (as displayed in our course syllabus), on the level of an individual class session with students, or even in a single ten-minute exercise performed during class.

Mathematicians took many centuries before they perceived the simple, elegant concept of the fractal pattern. Likewise, the order within our constructive chaos is not intuitively perceived by our students. We need to disclose our pattern of core values, concepts of learning, and priorities in our syllabus. That takes both knowledge of the discipline and considerable personal reflection on how we think the most students can best acquire the intended levels of knowledge. Thereafter we have to practice our stated philosophy at every scale of teaching practice. That is difficult because it is easy to forget what it is we really set forth to do amidst innumerable pressures and distractions. Looking at our core values in our philosophies before we construct each class exercise and every lesson plan helps us maintain our core patterns through stress and distraction. Again, a lecture is a lecture, problem-based learning is problem-based learning, collaborative learning is collaborative learning, *etc.*— pedagogical tools are different. We know to use a variety of tools as a means to reach more students, but within each we choose, our students should always be able to perceive a common order—the basic "pattern" found in our teaching philosophy and enacted in practice.

Also see back of this page for important announcements!)

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Volume 7 Number 3 March, 1999

Building a Teaching System - 3: Defining a Pattern in Content

In our last issue, we noticed how one could view successful teaching as managing a course based on a simple pattern that grows out of our teaching philosophy. In practice this involves consistently applying our core values, concepts about learning, and priorities across three dimensions: (1) content, (2) chosen pedagogy, and (3) assessment. This issue of *Nutshell Notes* focuses solely on content. Course content is rarely established in a vacuum. What to teach in a course arises in part from our choices, in part from curricular obligations governed by our department or discipline, and in part, at times, to fulfill a general educational responsibility. When a teaching system is established, course content is more than coverage of topics or text chapters. There are one or more unifying themes that carry through coverage of all the course topics. In a teaching system, these central themes are disclosed at the outset of a course and are reflected upon often throughout it.

As example, the physical and life sciences faculty at CU-Denver took steps several years ago to clarify the general university objectives for a core science course. They decided that the thematic outcomes would be an understanding of the physical world and how we gain knowledge about it—*i.e.* what science is and how it works. They further decided that these objectives would be met, if at completion of any core science course at CU-Denver, students were able to answer the following:

1. What specifically distinguishes science from other endeavors or areas of knowledge such as art, philosophy, or religion?

2. Provide two examples of science and two of technology and use them to explain a central concept by which one can distinguish between science and technology.

3. It is particularly important to not only know ideas, but also how these ideas originated. Pick a single theory from the science represented by this course (biology, chemistry, environmental science, geology, or physics) and explain its historical development.

4. Provide at least two specific examples of methods that employ hypothesis & observation to develop testable knowledge of the physical world.

5. Provide two specific examples that illustrate why it is important to the everyday life of an educated person to be able to understand science.

6. Many factors determine public policy. Use an example to explain how would you analyze one of these determining factors to ascertain if it was truly scientific.

7. Provide two examples that illustrate how quantitative reasoning is used in science.

8. Contrast "scientific theory" with "observed fact."

9. Provide two examples of testable hypotheses.

10. "Modeling" is a term often used in science. What does it mean to "model a physical system?"

11. What is meant by "natural and physical science?"

The above questions are disclosed in writing to the students during the first week, and are reconsidered again at the close of the course. While specific disciplinary content covered is indeed that given in the course descriptions of the university catalog, instructors in core science courses now have a clear, unifying pattern through which to develop and deliver diverse science content. The pattern's themes allow for instructors' creativity and disciplinary rigor, but also insure that the core educational responsibility is fulfilled.

Disclosing a fundamental pattern in content improves any course. It spells the difference between teaching with unifying themes *vs.* a course characterized by mere "coverage" of facts and topics. If we clearly and concisely present the unifying objectives of our course, then our students need not guess about how to think about the course material, how to master it, or how to recognize achievement of worthwhile outcomes.

Also see back of this page for important announcements!)

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Volume 7 Number 4 April, 1999

Building a Teaching System - 4: Defining a Pattern in Pedagogy

In our last issue, we noted the importance of constructing content around central unifying themes. If we don't clearly disclose to students what we want them to learn, we shouldn't be too surprised when they can't learn it. Yet, we cannot achieve the best outcomes through focus on content alone. Teaching is not simply telling of content. Instead of "telling," we need a sound pedagogy—a multi-faceted method of delivering content effectively to diverse kinds of learners. To discover the pattern of our current pedagogy, a *formative evaluation* provides an excellent diagnostic tool. Formative evaluations look for the practice of classroom skills that research has shown to be useful for students' learning. The presence of particular practices and the degree to which each is present is surprisingly consistent for an individual even across different classes. We want to know our pattern, because we want to tune our pedagogy so we truly practice in accord with our teaching philosophy—a goal easier said than done. If a tenet of our philosophy is involving students in responsibility for learning, then a formative evaluation should reveal strong student involvement. If respect for students is a tenet, then good rapport with students should result. Formative evaluations (1) reveal to us how our students see our pedagogical pattern; (2) validate our specific strengths, and (3) designate where specific changes will likely produce genuine improvements. Questions on formative evaluations are devoid of general measures of satisfaction, such as overall ratings of the professor, the course, or the "learning experience." Such ratings can't reveal how to improve either outcomes or satisfaction.

At CU-Denver we use a 60-item formative survey which includes 40 items (see back of this page and Figure 1) that focus on conveyance of content, clarity and organization, grading, student involvement, rapport and communication. An additional 20 items help diagnose the workings of collaborative and cooperative groups in classes that use them. The entire survey takes about twenty minutes of class time to complete. The returns are an excellent profile of our pedagogical pattern and incredibly useful insights about how to make specific changes that produce desired results. To request a formative survey, simply contact Ed Nuhfer through the phone or e-mail given on the masthead above. As point of information, deans, chairs, *etc*. cannot "invite" this form into a professor's class. Only the professor can invite it in, and the results are shared only with the professor. Try it! You'll like it!

Figure 1. Graphic output of mean scores on UCD's formative survey. The pattern of the graph reflects our pedagogical pattern through teaching traits we employ. Ratings on bundles of items that apply to a particular theme are more important than ratings on any single item. See back of this page for actual survey items.

SURVEY of CLASSROOM SKILLS

(1992, modified & used with permission of Center for Research & Development in Higher Ed., U of CA, Berkeley)

The items below result from research on traits confirmed to be good teaching practices. The higher the number on the graph (reverse side), the stronger the employment of a given teaching practice. Even the best paper surveys can generate bad data unless students are given instructions how to avoid the pitfalls. It is important that the data result from specific issues rather than general feelings, so students must be instructed to answer each question for the specific content it requests rather from their general feelings about the faculty member, the content, the classroom setting or anything not related to the topic of the item. Students must be instructed to leave any item blank which they don't have first-hand information about. Unless such cautions are given, students will feel obligated to guess, and in some cases guesses can overwhelm true knowledge. An example is question 29. Research shows that only a small percentage of students seek individual help, so only they know about this item. When students guess, the >90% who don't know about accessibility overwhelm the small percent who do know, and thereby two vastly different types of service to students can get the same rating. When students are informed about pitfalls of paper surveys, reliability of results shows dramatic improvement. Space for written suggestions for improvement are also provided on the form, so information comes from more than simply the items provided. The results of this survey are confidential and are a good basis for consultation between the instructor and a member of the CU - Denver Office of Teaching Effectiveness. Research shows that formative evaluation followed by consultation leads to changes that result in great gains in overall student evaluations.

Please use the following scale for your response to each question

Very descriptive		Somewhat descriptive		Not at all descriptive
(5)	(4)	(3)	(2)	(1)

1. Discusses points of view other than his or her own.
2. Contrasts implications of theories.
3. Discusses recent developments in the field.
4 Gives references for more interesting and involved points
5. Generalizes from examples and specific instances
6. Uses examples and illustrations.
7. Stresses general concepts and ideas.
8. Is well prepared.

9. Explains clearly.
10. Gives lectures that are easy to outline (or provides prepared notes that adequately serve this same purpose).
11. States objectives of each class session.
12. Summarizes to emphasize major points.
13. Is able to clarify or improvise in awkward communication situations.
14. Makes a few major points during lecture rather than many.
15. Appears to know if class is understanding him/her or not.
16. Appears to know when students are bored.
17. Uses a variety of instructional media/resources (films, slides, overheads, guest speakers, etc.).
18. Uses a variety of teaching methods besides lectures (demonstrations, field trips, writing, group work, etc.).

19. Identifies what he or she considers important for purposes of testing.
20. Uses exams effectively for synthesis and understanding of course material.
21. Is fair and impartial in grading exams, quizzes, etc.
22. Keeps students informed of their progress.
23. Has students apply concepts to demonstrate understanding.

24. Encourages class discussion/participation.
25. Invites students to share their knowledge and experiences.
26. Invites questions, discussion or criticism about ideas presented in lecture.
27. Is able to accommodate and relate to students as individuals.
28. Asks questions of students.

29. Is accessible to students outside of class.
30. Has genuine interest in students.
31. Gives personal help to students having difficulty in the course.
32. Has a concern for the quality of teaching and learning.
33. Encourages/motivates students to challenge themselves to do high quality work.

34. Has an interesting style of presentation.
35. Gives interesting and stimulating assignments.
36. Uses a range of gestures and movement.
37. Has a sense of humor.
38. Appears confident.
39. Varies the speed and tone of voice.
40. Is enthusiastic.

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Volume 7 Number 5 May, 1999

Meeting Evaluation with a Teaching System

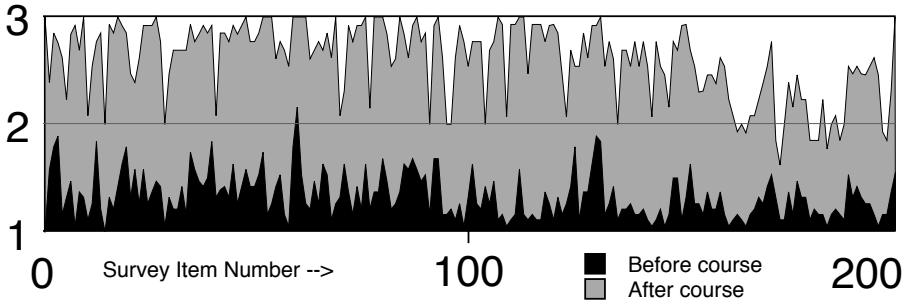
In this academic year's issues of *Nutshell Notes*, we have developed the platform of a "Teaching System"—a sound philosophy applied with consistence through every action of our teaching. When we have a true system, we have clearly outlined the learning outcomes we want to produce and justified their importance. We have chosen our pedagogy so as to produce these outcomes, and we have chosen how to evaluate the degree to which our stated outcomes were accomplished. When we have a true system, annual review becomes a concise, useful, and even a pleasant exercise. We simply demonstrate that we practiced in a way consistent with the values, goals and objectives of our philosophy (*NN* v. 6 n. 8 - n. 12), (1) by showing how we did so through our chosen pedagogy (*NN* v. 7 n. 4), (2) by demonstrating students' learning (this issue) and (3) by profiling students' satisfaction (Faculty Course Questionnaire—FCQ— ratings on global items). When we don't have a system, we risk being "evaluated" only on the basis of ratings of general student satisfaction from FCQs and the feelings these same ratings induce in administrators and colleagues. Student satisfaction is important, but rigor, content, pedagogy, learning and reaching specific outcomes are even moreso.

Learning is the most important outcome of our classes, and **knowledge surveys** are a direct method through which to detail the learning we caused. To create a knowledge survey, take the core objectives of your course and the learning objectives of each class meeting and arrange these in the form of test items in the order of course presentation. Students then rate their knowledge to answer each item on a 3 point scale.

Students cannot answer many high level questions in a reasonable amount of time, nor would an instructor have time to grade ensuing volumes if they could. But students can rate their knowledge through their current *ability* to answer any item. By giving the survey at the start and end of a term, any instructor can validate the learning that took place as result of their class. In the graph below, the first eleven items cover the core objectives of the course (*NN* v. 7 n 3), and the others are specific content questions that reveal content coverage, rigor, and level of thinking addressed in the course. For example, questions 24 and 25 are:

24. A case can be made that asbestos is a deadly hazard. What is the basis for that case?
25. The case can be made that the "asbestos hazard" is nothing more than a very costly bureaucratic fabrication. What is the basis for that case?

More on knowledge surveys can be found in *NN* v. 2, n. 7. Summer is a good time to review the Teaching System series of *Nutshell Notes* on the web and to build a system that works well for you. With a teaching system, it is easy to produce a review portfolio and a plan for improvement. **Best wishes for summer!**



1. = I have insufficient knowledge to answer this question.
2. = I have partial knowledge or know where to quickly obtain a complete answer to this question.
3. = I can fully answer this question with my present knowledge.

See other side for IMPORTANT announcements.

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Volume 7 Number 6 August, 1999

An Example—Teaching to Get Your Desired Outcomes

Most of us want our students to achieve higher level thinking, but often we don't teach so as to produce the outcomes we most want. Our students may then spend more time in memorizing than in learning to think. Last semester we introduced a concept called "alignment," which revealed the need to avoid pedagogy that is mismatched to our desired outcomes. In 1989, Eric Mazur of Harvard University encountered this mismatch in his introductory physics classes. Below is a memo he wrote (*Science Teaching Reconsidered - A Handbook*, Committee on Undergraduate Science Education, National Academy Press, Washington, DC, 1997, p. 22) describing his adjustments.

"In 1989, I read an article in the 'American Journal of Physics' that contained a test to assess understanding of Newtonian mechanics. I gave the test to my students at Harvard and was shocked by the results—the students had merely memorized equations and problem-solving procedures and were unable to answer the basic questions, indicating a substantial lack of understanding of the material. I began to rethink how I was teaching and realized that students were deriving little benefit from my lectures even though they generally gave me high marks as a lecturer. So I decided to stop preaching and instead of teaching by telling, I switched to teaching by questioning using a teaching technique I have named 'peer instruction.'

My students now read the material before class. To get them to do the reading, I begin each class with a short reading quiz. The lecture periods are then broken down into a series of digestible snippets of 10 to 15 minutes. Rather than regurgitating the text, I concentrate on the basic concepts, and every 10 or 15 minutes I project a "Concept Test" on the screen. These short conceptual questions generally require qualitative rather than quantitative answers. The students get one minute to think and choose an answer. They are also expected to record their confidence in their answer. After they record their answers, I ask their students to turn to their neighbors and to convince them of their logic. Chaos erupts as students engage in lively discussion of the question. I run up and down the aisles to participate in some of the discussions—to find out how students explain the correct answer in their own words and to find out what mistakes they make.

After one or two minutes, I call time and ask students to record a revised answer and a revised confidence level. A show of hands then quickly reveals the percentage of correct answers. After the discussion, the number of correct answers and the confidence level typically rise dramatically. If I am not satisfied, I repeat the cycle with another question on the same subject. When the results indicate a mastery of the concept, I move on to the next subject.

I have been lecturing like this now for more than four years. During this time the students have taught me how best to teach them. As for the students, nothing clarifies their ideas as much as explaining them to others. As one student said in a recent interview, 'There is this ah-hah! kind of feeling. It's not that someone just told me; I actually figured it out. And because I can figure it out now, that means I can figure it out on the exam. And I can figure it out for the rest of my life.'"

Mazur realized that he had to align his teaching methods in accord with the learning outcomes he wanted—which began with concept mastery. His letter reveals a number of good practices—limiting lecture events to 20 minutes or less (what research shows is the attention span of most audiences), allowing students to engage the concept, grapple with it and explain their understanding of it to others (in accord with what research shows improves comprehension and retention) and utilization of a classroom assessment technique (so that the concerns and levels of understanding of students are made visible at a time when poor understanding can best be addressed).

Consider building "alignment" into your teaching.

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Volume 7 Number 7 October, 1999

Four Variables of Developmental Instruction

Over 30 years ago, William G. Perry Jr. released results of a quarter-century research that clarified the stages of intellectual growth of college students. This work served as the core for subsequent work such as *Women's Ways of Knowing* and the "reflective judgement model." A controversial book, *Generation X Goes to College,* is an excellent case study in the problems and inept remedies that arise when professors, review committees, and college administrators fail to draw upon what is known about the nature of student development. Outcomes less often cited from Perry's research are four teaching or instructional variables to address the needs of students. We'll briefly introduce these here. The next few issues of *Nutshell Notes* will come quickly and deal with each of the four variables. These *NN* issues will be followed with coverage of the stages of ethical and intellectual development in students.

Structure is the framework and direction provided in a class. Students at the lowest levels of development need high degrees of structure; those further along need to grapple with more ambiguity.

Experiential Learning involves learning options designed to facilitate students' personal connections with content. This is often called "active learning" or "learning by doing." When we engage students in a research or design project, a role play, or data gathering followed by reflective interpretation, we are helping students to personally engage the material. Students at the lower levels need such experiences to obtain understanding and long-term retention. Recent guidelines such as the National Science Standards stress the need for such experiences. We can attest to the effectiveness of this facet—do we recall best the material in classes we took through the lecture method or the knowledge that we constructed for ourselves in our theses and dissertations? The caveat here is that this is only one of four variables we need to address. Creating active learning experiences is not all we need to do.

Diversity as an instructional variable does not refer to the "diversity" of race and gender. Rather it refers to amount and complexity of material encountered by the student. It requires us to provide a variety of assignments and methods of learning so that students can begin to distinguish *quantity* of material from *complexity* of material, and ideally develop skills that enable them to engage both kinds of challenges.

Personalism is an issue we touch upon when we speak about "communication," "social skills," "ethics," "community," and "ability to work with others." It governs the way we deal with students outside of class, and also the way we deal with one another. It is probably the most neglected of all aspects. The consequences of such neglect show up as dysfunctions within <u>all</u> levels of our educational institutions and our society. In terms of the "Seven Skills Employers Want," defined in 1988 by The American Society for Training and Development, five of these are dominated by personalism that is not often developed by traditional formal education.

The 1999 Teaching Committee has decided that our special emphasis for the rest of the academic year will be around "personalism"—not only how to develop that in our students, but also how to better connect with our students, our staff and our administrators. If we are to build a superior learning community, we simply have to improve beyond the level of personalism that characterizes higher education in general. Because of the importance of this aspect to us, we are not going to entrust our annual February workshop to an "outside expert." Instead, we are going to take on that responsibility for ourselves. It is important that all levels of the university be included and participate this year in this particular effort in development. The faculty are only one of several groups on campus who can benefit by improved awareness of personalism. Flip the page of this and subsequent issues for announcements of activities regarding this year's emphasis.

See other side for IMPORTANT announcements.

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Volume 7 Number 8, December, 1999

The Perry Model of Students' Intellectual Development (1)

In the last issue, we noted that William G. Perry, Jr., identified the stages of intellectual growth of college students. From least mature to higher levels of undergraduates' development these are: (1) **dualism**; (2) **early multiplicity**; (3) **late multiplicity**; and (4) **contextual relativism**. We'll consider each stage from the standpoint of views about knowledge and the roles students see for the instructor and for themselves. Awareness of these stages is useful for teaching in the sense that "know thy audience" is useful for writing and speaking. Further, it enables both an individual and an institution to assess global outcomes of education by answering: "Beyond absorbing factual knowledge, does the education we deliver enable students to increase their capacity to think and to reason?"*

The *dualistic thinker* has certainty that there are right and wrong answers to every problem. A "good teacher" will be seen by dualistic thinkers as one who provides absolute authority as a source of knowledge, and an ability to clearly convey "the truth." Students see their role as receiving information and demonstrating that they have learned the right answers.

Students in *early multiplicity* begin to realize that some important real life questions just don't have unique right and wrong answers. These students still believe in a "right way" to approach problems, and view a "good teacher" as modeling the process of learning. Students who have arrived successfully at this stage see their role as learning how to learn, and they sense the need to apply themselves and to work hard in order to master a subject.

The stage of *late multiplicity* arrives when students begin to discern and value good evidence as opposed to mere opinion and feelings. A "good teacher" is likely seen by these students as a model thinker from which one can learn the processes of thinking and discerning. Students succeed as they begin to value thinking for themselves and to use supporting evidence to reach beyond personal preconceptions. However, some students have a regressive reaction when they realize that important issues do not often have unique right and wrong approaches or solutions. Students who go overboard at this stage may see all opinions as equally valid, and can discount expertise and the effort needed for mastery. The value of an instructor may likewise be discounted. Until they get can past this reaction, such students are unable to make good use of evidence, advice, or constructive criticism.

Contextual relativism is reached when students are able to distinguish reliable information from the ideals of infallibility and absolute truth. At this stage, students can distinguish that, while a situation might not be suited for generating strict right or wrong solutions, there are nevertheless degrees of reasonable and unreasonable methods that can be employed, and these are likely to generate appropriate or inappropriate solutions accordingly. In short, knowledge is seen as contextual and is judged on the basis of circumstances that are evaluated by good thinking processes and employment of best available expertise. A "good teacher" is seen as an expert guide or consultant. While expertise is valued, experts are valued as resources rather than as sage dispensers of "truth." Authority is valued as arising from expertise and ability to provide this in a setting that promotes mutual learning. Students begin to see their role is to apply knowledge rather than to just acquire facts, to shift between contexts, and to be able to discern adequacy and reliability of information.

These stages represent a necessary progression, and ideally an undergraduate program culminates with students solidly aware of their place at the upper stage. However, "ideal" is not reality. For a variety of reasons, some probably not yet clearly understood, even educated adults can remain forever at lower levels. We can minimize those who "get stuck" by providing appropriate structure, experiential learning, diversity, and personalism, (last issue v. 7 n. 7), but the recognition of stages certainly underscores the importance of **relating to students as individuals.** To best help a student, we have to become familiar, not just with what a student knows, but also the degree to which that student has developed to confront knowledge.

***See CSM invitation on back of this page.**

See other side for IMPORTANT announcements.

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Volume 8 Number 1, February, 2000

The Perry Model, Personalism and Beyond

In the last issue, we noted that William G. Perry, Jr., identified the stages of intellectual growth of college students, and we considered each stage from the standpoint of views about knowledge and the roles students see for the instructor and for themselves. Four developmental instructional variables: *structure, diversity, experiential learning* and *personalism* (Knefelkamp, 1981, in Perry, 1999, Table I.2) can be employed to address the stages. We introduced these briefly in *NN* v. 7 n. 7, but in this issue and the upcoming workshop, we are going to focus on PERSONALISM.

Knefelkamp (1981) discusses the aspect of personalism as follows: "*The classroom is a community of scholars where it is safe to learn, where risk-taking is encouraged, where students learn rational dialogue and objective discussion, and where they learn to listen to one another and to evaluate ideas and concepts. Personalism includes the amount of interaction in the classroom, the amount of legitimacy given to helping students make connections between subject matter, and the ways they are thinking about out-of-class-issues. It does not include inappropriate self-disclosure. It varies from moderate to high on the continuum.*"

The literature of faculty development shows that the above discussion is a bit incomplete, because important amounts of teaching and the promotion of student growth take place outside the classroom. Some studies have shown that one of the largest distinctions between superbly successful teachers and those less successful lies in how these faculty interact with their students outside of the classroom. If we want to use "personalism" as a term that applies to classroom communication, then we must recognize that maximizing success as a professor requires doing more than just this. Outside communication with students that involves teaching includes advising, leading field trips, supervising independent research, sponsoring and working with student clubs, and having discussions with individual students concerning their future study or employment.

Deeper inspection reveals that personalism and interaction with students outside of class are not only skills involving communication, but practical employment of these skills is rooted tightly in ethics.

What happens when Knefelkamp's ideal classroom as a "...community of scholars..." isn't? How can we provide advice when asked for help with a situation that requires experience that really is not in our backgrounds? What happens when we find ourselves in a situation that is neither ideal nor "safe?" What happens for us, and our students when rational dialogue and objective discussion give way to something less? We cannot always exist in an ideal environment even if we always behave in the most ideal way (and who among us always does?). So how can we make the most of less than ideal situations? Most often, nothing—not our training for our disciplines, not our backgrounds, not even formal teacher training —gives us preparation for the difficult challenge and poignant moment that is likely to be remembered for the rest of the life of someone involved. Rest assured that such moments will be remembered for good or for ill.

If you are looking for "the answers" to the above situations in this issue, I now have to disappoint you—temporarily. The vehicle needed to provide practical knowledge to deal with unusual challenges and difficult situations is not a one-page newsletter. But, while I can't give you the answers here, I can sponsor a one-day workshop and provide two books with it that will indeed be helpful! See back of this sheet for details.

Next, let me conclude by noting why your presence at this workshop is important. If you are a faculty member who is experiencing difficult situations, you are no anomaly. These situations are, nationally, increasingly common. If you are in a department or unit in which such situations seldom occur, become aware of the situations your colleagues are facing. They too are part of UCD, and you may be judging these colleagues later on a review committee. Finally, if you have handled difficult situations especially well, please attend and share your experience, skills and innovations. They are needed by others here. The basis for this workshop will be the real cases that are occurring in our institution.

See other side for IMPORTANT announcements regarding the Workshop.

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Volume 8 Number 2, March, 2000

The Perry Model, Stage 1 - Dualism Encounters the Serpent

In *NN* v7, n 8, we introduced dualistic thinking as a level of thinking characterized by certainty that there are right and wrong answers to every problem. Dualistic thinkers see good teachers as those who project authority as sources of knowledge, and who clearly convey facts. Dualism, if nothing else, is comfortable. Perry notes that challenges to such thinking are at least as old as the *Book of Genesis*:

> *"It was, after all, the serpent who pointed out that the Absolute (the truth about good and evil) was distinct from the Deity and might therefore be known independently without His mediation. The Fall consisted of man's taking upon himself, at the serpent's suggestion, the knowledge of values and therefore the potential of judgement."* (Perry, 1999, p. 67)

In any process where lifelong and often cherished beliefs are challenged, apprehension, discomfort, and even resistance should be expected. Taking on the responsibility for thinking and judging can force one out of "Eden"—whereas one could once relax in the comfort of certainty and the security of authority, one must now learn how to resolve contextual issues that have competing (and seemingly reasonable) solutions. Rather than finding a single one of these solutions anointed as "right" by authority, one will instead find several sources of authority in conflict or even in hot confrontation. The role of the university in this process is indeed as "serpent." (Small wonder some see us educators as the devil incarnate!)

Perry's work shows that advances to contextual thought from dualistic thought and toward truly questioning authority (rather than simply dismissing it) are not achieved in an instant of enlightenment. Rather, the transition occurs through a series of experiences and reflections. The transition is captured in a student's statement:

> *"When I went to my first lecture, what the man said was just like God's word, you know. I believed everything he said, because he's a professor, and he's a Harvard professor.... And -ah, ah people said, 'Well so what?'...And I began to ah, realize."*

In practical terms, what do Perry's results provide for us as teachers? The wisdom to act on "what is" rather than on "what is supposed to be" can be one benefit. The reality is that most of our students enter college without the intellectual development that we have achieved. We often wish: "If only we had better students!"—"better" meaning "capable of reasoning at our levels." Perry's results reveal this to be an unrealistic wish, so being upset or critical by believing "students today can't think well" is just a ticket to our own burnout and dissatisfaction. Undergraduate students are not yet ready for the same kinds of intellectual grappling that we find stimulating from our professional colleagues. When students fail in their ability to deal with ambiguity or open-ended problems, it is rarely because they are being obstinate or because they are unintelligent. Rather, it is probably because they are not so far along in their transition toward the level of thinking at which they will, given effective educational opportunities, surely—but later—arrive. Perry's work reveals this transition won't be made in a single moment or a class, so there is no use in flagellating ourselves or our students because they don't yet reason like us.

Just as a successful writer must know her or his audience, a professor must know his or her students. In this context, the principle (*NN* v1, n8) "Good practice communicates high expectations" works only when the "high expectations" match the real students we have, and not the ideal students we wish we had. Perry's work is invaluable in helping us to set realistic learning objectives that help students to advance in intellectual growth. We should not expect our individual effort to bring about the full transition. However, our collective efforts should do so. We expend much effort on evaluating professors, but little on assessing collective outcomes in intellectual development at the curricular and university level. **Why is that?**

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Volume 8 Number 3, April, 2000

The Perry Model, Stage 2 - Multiplicity—A Bull in the China Shop

The transition from dualistic thinking (NN v8 n2) to the early stage of multiplicity is vexing for students. This is captured by one student's view of a general education science course

> *".... It's supposed to teach you to, ah, reason better. .... Actually, what you get ...is...an idea that science is a terrifically confused thing in which nobody knows what's coming off anyway."*

Multiplicity involves broadening one's view of learning from the receiving of factual information from authority, to recognizing the deeper learning that results only from labor intensive construction of the information by self and with others. It is a stage of growth that is trying for students and teachers. Sometimes frustration will be vented on the perceived perpetrators of discomfort—professors—and expressed in negative comments on student evaluations. (Yes, it's that time of year.)

In Perry's interviews, which formed the basis for his model, students' reactions in the early stages of multiplicity include anger, resentment, and defensiveness that veil a soon-to-arise suspicion that the confusion is within them rather than within the content or instructional methodology. As the suspicion arises that there is order in the confusion, an initial misperception arises: that authority already owns "the answer" and that it is being witheld for nebulous reasons. This tends to distract students away from conceiving of the process and choices of their own thinking, and into perceiving that their goal is to discover "what the professor wants." Given the challenges inherent to this transition, it's easy to see why teaching is difficult, and why communication is such an indispensable part of of our work!

Let's see how this aspect of Perry's work can help us in our practice of helping students to learn.

(1) When we intend to teach mainly disciplinary content, then disclosure of what we intend to cover at the beginning of class and a summary wrap-up at the end will be very helpful. But if we intend to teach "critical" (higher level) thinking, then disclosure of process, its effects, and modeling this process is even more important. When we teach an aspect of critical thinking, we should run a classroom assessment such as a one-minute paper (NN v1 n 6) at the end of class to see if the most important concept we taught is the one the students recognized and understood. There is a difference between perceived disorganization by students and a truly disorganized class that has never been grounded in operating concepts. We may not be able to totally eliminate the former, but we can plan and teach so as to minimize both situations.

(2) We need to be careful not to get caught up or react badly when we encounter defensiveness of students. It is irritating when a student says "I don't know what you want! The grade *you* gave me is *just your opinion*, and it's no better than mine." This is a poignant moment from which student growth or a lot of broken china will be the outcome. Unless we're moving out of the business of teaching and into the business of destroying self-confidence, this is no time to "put that person in her/his place." Instead, remember that Perry's work shows that the transition from dualism to multiplicity is a growth period replete with frustration and tested confidence. It also reveals that the separation of evaluation of self from evaluation of work won't occur until later, during development of contextual relativism. Chances are pretty good that the comment above is not so much about us as about a student's simply being scared to death that he/she perhaps can't think as well as he/she believed. Now is a good time to reteach the process, possibly tell the student about Perry's work, which reveals students who are growing intellectually will feel like making such comments, and resolve to teach more about process in the next class.

(3) When reviewing fiery comments written by students on their teacher evaluations, reflect on how growth may elicit venting. There shouldn't be many such comments, but one or two may be unavoidable. We should make changes when needed, but never allow such comments to damage our self-confidence.

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Volume 8 Number 4, August, 2000

The Perry Model, Stages 3 & 4 of Multiplicity—Glimmers of Hope

Welcome back everyone! Also, a warm welcome to new faculty, instructors, and members of the Colorado Commission on Higher Education, housed on our campus in the Lawrence Street Center as of about mid-September.

This issue continues with the theme we began before summer, the Perry model of intellectual development. Perry's work addressed an outcome of education that has to do with students' growing ability to think at higher levels. Thinking is an outcome less often assessed than student satisfaction or content learning, but it is probably the most important. In *Nutshell Notes* v8n2 and v8n3, we described the lower stages of development: "dualism" and early "multiplicity" (see the web site given at the bottom of this page). We noted that working with students in these stages is a source of consternation to those faculty who deduce that their students are inferior if they can't quickly make the leap to the faculty member's level of thinking. Perry's work shows that even Harvard students' intellectual growth takes more time than a single course can provide. The transition from dualism, where every legitimate problem is perceived as having a uniquely "right" solution, to early multiplicity, where recognition occurs (maybe grudgingly) that legitimate problems can have multiple reasonable solutions, may in itself be considered an important advance for a student.

Perry deduced three stages of multiplicity. Early multiplicity, as noted, is a stage accompanied by students' frustrations. It is a stage where students suspect that authority (the teacher) actually possesses knowledge that allows easy solutions to problems but the authority is withholding it from them. In this issue we focus on the mid and late stages.

Mid-multiplicity arrives in recognizing the legitimacy of uncertainty, and that uncertainty and ambiguity are not the results of withheld knowledge, but rather they are part of the nature of knowledge itself. Students in mid-multiplicity realize that the ambiguity that frustrates them poses the same challenge for those who are experts in a discipline. Perry captures this realization in a student quote: "Here was this great professor, and he was groping *too*!" It is at this stage where glimmers of hope appear: the possibility opens for students to move beyond reliance on authority to reliance on obtaining information and working to understand it as a means to construct and master their own knowledge.

Stage 4 multiplicity is thus characterized by recognition of the importance of thought process and, in particular, the need to acquire skills to deal with ambiguity. Perry notes that this level can be reached by either the hard way or an easier way. Students who choose the hard way remain in revolt against authority, and so they oppose it (sometimes in an in-your-face manner) by espousing against almost anything authority espouses. They demand that authority justify itself by *reason* and maybe even *evidence*. Thereby they are confronted with the necessity to do the same in order to have any basis for opposition that can be taken seriously. Those on the easier path begin to sense that authority is leading them to acquire skills to confront ambiguous issues with reason and evidence. With this sense comes a realization that process is a learning objective with intrinsic value, perhaps even equal to that of content.

Perry delivers a message to us that is well known to successful writers: "know thy audience." When we recognize the progression of stages of intellectual growth, we can easily accept students at any stage they are at and then help them move on to the next stage. Once we know about Stage 4 growth, we can appreciate the in-your-face student and award ourselves a little kudos for having helped him or her arrive at understanding the importance of evidence. We have a responsibility to enable transitions to higher level thinking, and one way we can do so is to clearly teach and model process.

NUTSHELL NOTES

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The Perry Model, Stage 5 Relativism —Punctuated Change

Passages from dualism through the three stages of multiplicity are, in general, traversed gradually by students. In comparison, the passage to relativism is a punctuated change characterized by realization and replacement of a long-standing paradigm. This revolutionary change occurs at the individual level of the student and is not something that can be counted upon to occur at any particular class rank or time.

In multiplicity, students recognize dualism as one particular approach to thinking. Relativism is achieved when students recognize dualism as a limited method of thinking—one that works only for simple problems, which are not representative of most problems encountered in real life. The stage of relativism is also called "contextual relativism," because multiple ways of thinking about an issue are now perceived not merely as alternative choices of equal value, but rather as choices among thought processes that have different value and are either appropriate or inappropriate to the context of the problem or issue addressed. In essence, relativism is achieved when one recognizes the value of having a system for deciding which among multiple arguments or working hypotheses is indeed likely to be better than its competitors.

Perry captures the realization in an interview with a student: *"I don't know if complexity itself is always necessary. I'm not sure. But if complexity is <u>not</u> necessary, at least you have to find that it <u>is</u> not necessary before you can decide, 'Well, this particular problem needs only the simple approach.'"*

This ability to distinguish relative value of competing arguments involves development of conceptual frameworks from which to make judgements. Any framework is itself contextual, and frameworks must differ in much the same way that rules must differ with different games. For example, a student may be told that a particular argument or claim is "scientific." A framework one can use to evaluate the claim is to query (a) whether the argument or claim is about the physical world (matter, energy or rates of change of these) and (b) whether the argument involves testable hypotheses. If true, then the scientific framework should work well as a means to evaluate the validity of the claim against its competing explanations and hypotheses. If the issue cannot meet both of these essential criteria, one may well be dealing with an issue of value, but one that likely cannot be resolved well within the framework of science or scientific methodology. A good example of an issue not readily resolved through the framework of science is "What is good teaching?" Can it be deduced on a scale of one to five based on student ratings of faculty; by measures of student learning of content; by measures in changes in students' ability to think; by how students are inspired to continue with lifelong learning on their own? Clearly the question is important, but because it's not resolved by any study of the physical world or by testing any single hypothesis, another framework, other than the purely scientific one, would be more appropriate for resolving this issue.

Studies by King and Kichener (1994, *Developing Reflective Judgement,* San Francisco, Jossey-Bass, 323 p.) show that most new holders of undergraduate degrees have multiplicity as the most sophisticated mode of reasoning that they can routinely use to address real-world problems. Dr. Craig Nelson in "Tools for Tampering with Teaching's Taboos" (*New Paradigms for College Teaching, 1997,* Edina , MN, Interaction Press, p. 66) notes that this disappointing outcome is common to students of both liberal and professional education.

What can we do to better promote the passage from multiplicity to relativism? We can teach the conceptual frameworks of reasoning that lie at the cores of our disciplines. We can provide these in our syllabi, in our lessons, and we can require students to apply frameworks to real world problems that reveal each framework's strengths and limits. We can formally structure in some "thinking about thinking."

See reverse side for announcement of mini-series on Unit Level Assessments

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Volume 8 Number 6, October, 2000

The Perry Model, Stage 6 - The View from the Springboard

There are nine stages of development in the Perry model, but only the first five are usually mentioned in written discussions of intellectual development of college students. Reasons for this include (a) the fact that most baccalaureate graduates never get past stage 4 and (b) the fact that the most-used method of assessment of students' levels of thinking ("Measure of Intellectual Development—MID" deduced by L. L. Knefelkamp in his 1974 dissertation at University of Minnesota) assesses only through stage 5. We should recall that Perry's work was titled *Forms of Ethical* [emphasis mine] *and Intellectual Development in the College Years*. Subsequent workers such as Knefelkamp and King and Kichener (*Developing Reflective Judgement*, 1994, Jossey-Bass, 323 pages) focused on cognitive development. These researchers believe that stages above position 5 are something apart from intellectual development.

Stage 6, the topic of this issue, lies at the transition between "ethical" and "intellectual." Stages above stage 5 are more abstract, but are nevertheless important because they describe how intellectual development affects how one lives his/her life.

Stage 6 precedes an act, as Perry notes, "...an act in an examined, not an unexamined life." Stage 6 is somewhat akin to the view achieved when balancing on a springboard before a dive. One recognizes here how acquired knowledge and experience provided the choices and awareness of limitations. The examined life yields options that include whether one will continue with or break from values acquired in the past, and involves decisions about the degree to which one will exercise freedom given the increased choices. This stage differs from the yet higher stages (to be covered in subsequent issues) in that it marks a place where commitment is seen as a way to resolve major relativistic problems, but such resolution is here merely perceived and not yet actually experienced. Stage 6 perception has several facets that include discovery, areas of content, stylistic balances and "commitment to commitment."

Discovery involves the recognition of responsibility for constructing the value of one's own life through one's own actions. It involves a dawning awareness that "to know" is insufficient; one must act in order to create value.

Areas of content include any venue in which the knower seriously envisions acting. They may vary from the immediate commitment to apply oneself to the academic task at hand to longer term venues such as committing to a career, following a vocation, clarifying a set of moral values through which one will live life, or reconsidering the practice of religion in the light of changed awareness. No matter what area is considered, recognition of a need to commit to an action in the future is the common thread that links all such areas of consideration.

Stylistic balances involve students' conceptions about potential consequences of actions not yet taken; the decision to specialize requires giving up breadth; the decision to take a strong inflexible position involves the risk of being proven wrong; the decision to remain objectively detached removes the experience provided by full personal involvement.

Commitment to commitment was not anticipated by Perry's research team and is a borderline stage 7 phenomenon. It arises when one has not yet made specific choices, but nevertheless has fully identified with making them. This is exemplified in one student's statement: "*I know that, ah, if I really wanted to do something I could find a way of doing it, so I feel much more at peace with the world*."

Stages beyond stage 5 have special meaning to those who instruct graduate students and non-traditional adult learners. At CU-Denver, we have a high proportion of older students with real-life experiences. The experiences that previously required these particular students to make commitments now enable them to evaluate the results of taking responsibility for learning in the context of life rather than in just the abstract context of "the classroom." This is one reason why we often consider older students to be our "best" students. It is not because they have grown more "intelligent," but rather because they have become more capable of taking responsibility and initiative on their own behalf.

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The Perry Model and Commitment—Stages 7, 8, and 9

This is the final issue on the Perry model. Perry's *Forms of Ethical and Intellectual Development in the College Years* was based on a study of Harvard students. This landmark study provided the first detailed answer to the question: How does college-level education actually change one's ability to think?" A number of subsequent workers have confirmed the validity of the basic pattern described by stages 1-6 of the Perry model. But stages 7-9 are "fuzzier" and involve a melding of the moral, the affective, and the intellectual. They do not fit easily within the topic of cognitive development. Neither do these stages clearly describe "*Ethical...Development*" because they were never presented in the context of the more universally accepted principles and rules of ethics. The three stages presented in this single issue reflect their compression into a single chapter of Perry's book. Although these stages were those minimally developed within the original work, R. Slepitza and K. L. Knefelkamp later extended the Perry model beyond college students and into the realm of the career development of professionals. They found characteristics in developing professionals that were consistent with stages 7-9 described by Perry. Young professionals are the clientele often served by our own CU-Denver graduate programs, so awareness of these stages provides some insights about the probable struggles that occur in the minds of our students. Stage 9 was not even expected by Perry's research team to arise from an undergraduate education alone. Such seasoned thinking results from experience itself rather than the idea of experience. Yet, the team did find evidence of stage 9 kinds of thinking in about 10% of the Harvard seniors.

Stage 7, "**initial commitment**," describes a state when students take responsibility for who they will be in some major area of life. For example "I have decided to become a teacher" expresses not merely an important decision, but personal identification with that decision and some awareness that it is a life-changing commitment. When such a statement is made at the undergraduate level, there is often still opportunity to change one's mind. A graduate degree, however, is rarely pursued for the purpose of "general education" or becoming "well rounded." The choice to initiate graduate study is one that has been some time in the making.

Stage 8, "**orientation in implications of commitment**," arrives when awareness permits the decision to be addressed in expanded and more specific detail. An example is "There are many effective ways to teach; what kind of teacher do I want to be and why?" Another might be: "I had no idea how demanding teaching can be! Can a teacher live a balanced life with other interests and a family?"

Stage 9, "**developing commitments**," is a position that Perry relates with "maturity." It describes a self-image that comes from significant experience coupled with reflective thought rather than from reflective thought alone. An example might be "I entered teaching because I was so inspired by the classes I took from a particular professor. But after teaching for a year, I realize that I am not a naturally passionate orator who can easily hold a class spellbound. I need to explore other ways to engage students in order to better promote and inspire their learning." Such a comment shows that strong commitment is not a simple rigid plan, but rather a decision that leads to continual growth, negotiation, searching and the ever-present possibility of change.

Perry associates stages 8 and 9 with "stylistic issues"—an association of one's identity with commitment as shaped by "temperament, preferences... courage, understanding, and care." Shaping involves balancing tensions that include: personal choice *vs.* external influence, doubt *vs.* security, benefits of specialization *vs.* loss of alternatives, idealism *vs.* realism, and self interest *vs.* interest for others. Awareness grows that life success is not a result of solving problems (even complex ones), but also involves managing onself well within situations that won't have perfect resolutions.

See back of this page for important announcements

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Volume 8 Number 8, November, 2000

Brain-based Learning 1—Optimal Environments?

Learning is the evolutionary brain function that once ensured our survival. As a result, our brains quickly capture and retain information that is novel or unusual, and this trait can be exploited to good advantage when teaching. This issue deals with some surprising findings; some may seem like fodder for the "Skeptical Inquirer," but do have confirmation in research. The brain learns through the senses, so what is felt, seen, heard, and even smelled can have surprising effects.

How does it feel? When an environment feels uncomfortable, our tendency is to escape from it rather than learn in it. If an environment feels physically uncomfortable, psychologically unfriendly or threatening, it won't be a good learning (or working) environment. We know how temperature affects our ability to remain attentive. Given a choice, we'd leave a too cold or too hot room; not given a choice, we'll "tune out" whatever doesn't lead to granting an exit.

How does an optimal learning environment look? Over 80% of the information our brain receives is visual, so light and color are two important attributes that will affect how the brain learns. Psychiatrist Wayne London did a famous experiment in classrooms in 1988 when he used the Christmas holiday break to replace the standard fluorescent bulbs in several classrooms with Vitalite® full-spectrum lighting. The result was a 65% drop in student absences. In 1991 Dr. D. B. Harmon studied about 160,000 school children and learned that about half of these suffered detrimental effects from classroom lighting. In 1987 the American Psychological Association officially recognized a disorder—seasonal affective disorder (SAD)—which is a depression caused by lighting typified by the season with the shortest daylight. Studies have also shown this season (the season of now!) to be less favorable to learning. Good lighting provides a compensatory remedy. Most studies show that soft, full-spectrum lighting is optimal for learning; the prevalent fluorescent lighting used in most classrooms and offices is rated among the worst possible choices for long periods of learning or working.

In 1999, Vuontella and others studied the effects of color on learning by comparing verbal cues for recall with color cues. Learners invariably did better using color. Morton Walker in his book, *The Power of Color*, deduced that the long wave colors (red, orange, yellow) stimulated more active brain response, whereas shorter wavelengths (green, blue, violet) were more conducive to relaxation.

NASA scientists have discovered that the presence of plants in a room seems to stimulate learning—not merely because of their green color but because of their ability to increase negative ions in the air and remove pollutants. Some house plants are more effective than others. Studies have confirmed that the presence of plants in an office increases productivity by about 10%.

What might the ideal environment sound like? Studies reveal that learners have divergent preferences. Some prefer complete silence; others prefer a noisy, busy environment. Studies have shown that extraneous noise is detrimental to most learners, but music is a more controversial issue. A number of workers have tried to relate use of various types of background music to increased learning. The most famous of these claims (the "Mozart effect") was recently disproved. Yet, a number of teachers do use music to good effect at the start of a class or during breaks to help create an atmosphere that is positive and energized, but relaxed.

The olfactory senses stimulate the brain, and optimal learning environments may come with distinctive smells. Neurologist Alan Hirsch discovered that groups exposed to the aroma of peppermint solved puzzles 30% faster than the unexposed control groups. Basil, lemon, cinnamon and rosemary seem to have a similar stimulating effect, while other odors elicit relaxation.

Try some of these things for yourself in your own office, and to learn more sign up for the February 16 workshop. See other side for details. This issue is primarily a summary of information compiled in Chapter 5 of Jensen, E., 2000, *Brain-Based Learning*.

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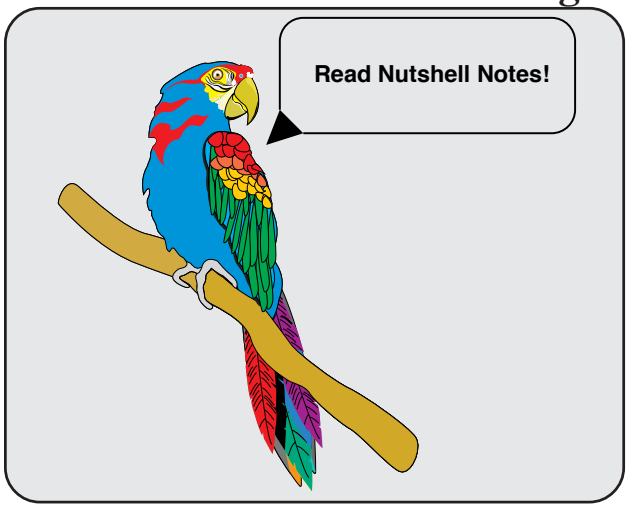
Volume 8 Number 9, December, 2000

Brain-based Learning 2—A Unifying Framework



This is the last *Nutshell Note* of the millennium! This is timely, because the theme of this issue ties together much that we've done and learned together since 1992.

Brain-based learning provides any teacher with a central unifying framework through which to evaluate concepts and models that are rapidly being added to the literature on practice of higher education. Reflecting on how the brain works can also serve as a good "crap detector" to filter out both any trendy fluff and personal biases based on little substance. For example, when one realizes that learning, at the basic level of the brain, involves self-initiated brain changes, it becomes obvious why any teaching philosophy/practice that fails to emphasize student responsibility is flawed. If we know that the brain can change physiologically in response to learning, just how good a predictor of future achievement can one measure in time, such as a test-based "IQ" score, really be? Should benefits be better achieved by classifying and teaching students according to their "multiple intelligence type" or by treating students as unique individuals but with commonalities that arise simply from possessing a human brain? These are true critical thinking issues!

In 1992 through 1996, we emphasized several teaching practices that involve intensive interactions with and between students. Considerations of the brain reveal that such practices result in significant increases in learning because time spent in class employing many senses, communicating with others and making decisions will build more synapses than will just taking notes and memorizing facts and terms.

From 1997 through 1999, we emphasized "teaching systems," which are sophisticated ways of using focus and organization to maximize results in producing the learning outcomes we want. The system approach involves not merely organizing content knowledge and selecting good teaching practices, but also harnessing emotional energy and building group intelligence (essentially a "group brain" connected by communication, whose " parts" are housed in separate skulls) with our students as a way to maximize learning and with our peers in order to optimize unit effectiveness.

Most recently (1999-2000) we emphasized an educational outcome in progressive ability to think at higher levels (Perry model). Studies on the brain verify that such learning does physically and progressively change the brain. So if we want high level thinking as an outcome, we can indeed practice so as to produce it.

When one realizes that new knowledge becomes a part of memory through synapses that are organized then stabilized by use, it reveals that good teaching practices are those that promote and accelerate indelible brain change beyond what a student would likely be able to achieve on his or her own. When "good teaching" is seen as the practice of creating situations that maximize such effects on students' brains, it becomes evident why models that emphasize the value of learning while de-emphasizing the value of teaching should be viewed with healthy suspicion.

Effective lessons that promote brain change just don't materialize out of thin air; these require informed planning and an investment of time and hard work by teachers. **So here, at the end of the millennium, I thank all of you for the hard work that you do and for being the extraordinary teachers that you are!**

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Brain-based Learning 3—Nutrition for Scholarly Performance

The concept of "mind" and "body" as separate has particular perils for scholars; our brains are as physical as any other part our bodies.

We all breathe the same air, but we all don't have the same oxygen-carrying capacity to our brains. Physical activity increases the flow of oxygen to the brain, and non-repetitive movements such as those often found in dance, gymnastics, or martial arts have surprising positive effects on academic performance, especially on spelling ability and reading comprehension.

The brain is more than 80% water. In 1995, neurophysiologist C. Hannaford noted that poor learning performance can often be traced simply to mild dehydration. Dehydration is a special problem in areas like Pocatello typified by dry air and high altitude. Learning specialists advocate eight to fifteen glasses of water daily to optimize learning performance. Soda, coffee, and common tea are considered as substandard water substitutes. Although some professors ban eating and drinking in class, one should rethink such policies, especially with respect to bottled water.

Glucose is a major nutrient used by the brain, and glucose is most depleted after a night's sleep. Thus "Breakfast of Champions" has special meaning for academics. Students who skip breakfast to attend a morning class will not be at their best potential for learning or participation.

Tyrosine, the amino acid found in meats, fish, dairy products and tofu, is critical to mental performance. Low income students may breakfast only on breads or processed cereal, and such breakfasts, largely devoid of tyrosine & choline, don't provide nearly the boost for thinking and learning as do those with a good protein source.

Memory, alertness, visual ability, attention, and focus needed to undertake organizational tasks are all affected by vitamins and trace nutrients. In particular, vitamins C, E, and A, the B vitamins B-6, B-12, choline (see "Boosting Working Memory," Science v. 290 Dec. 22, 2000, pp. 2275-2276) and folic acid, along with the trace nutrients magnesium, sodium, potassium, zinc, iron, boron and selenium are important. A study in 1988 revealed that groups who received a single multivitamin supplement outperformed control groups in reaction time, visual acuity and in measures of intelligence. Megadoses apparently have no discernible added benefit. On the other hand, deficiencies of essential nutrients can result in lethargy, fatigue, failing memory, poor concentration, and even depression and hostility. Taking a multivitamin each day, and having healthy, frequent snacks are habits worth cultivating.

How about herbs? According to a brief readable summary in Skeptical Inquirer (2001, v. 25, n. 1, pp. 43-49), a few really do improve cognition, although researchers caution against concurrent use of some herbs with certain prescription medications. *Ginkgo* has been the most thoroughly researched and validated as a cognitive activator. Ginseng (*Panax ginseng*) has also been shown in several studies to facilitate learning and memory. Both herbs seem to work by enhancing electrical activities associated with memory formation and by increasing the production or enhancing the activity of acetylcholine, which is a neurotransmitter utilized in memory and other cognitive activities. Kava (*Piper methysticum*) is an herb known for producing a calm but alert mental state. Its effects are similar to some antianxiety drugs, but without their sedative effects. Some spices, particularly sage and turmeric (a yellow spice ingredient of curry powder) are also tied to improved brain function.

Good nutrition and exercise practices that enhance performance in sports are well known. Similar practices can improve learning performance.

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Volume 9 Number 2, April, 2001

Brain-based Learning 4—A Summary of "Good Practice"

This issue summarizes "good teaching practices" as considered from the standpoint of what we know about how the brain learns. Learning at the level of brain biology involves the establishment and stabilization of neural connections (synapses), so "good teaching practices" are those that most effectively build and stabilize synapses. Let's consider research on student evaluations from the standpoint of such practices.

Importance of Instructional Dimensions on Different Indicators

(from Feldman, K. A., 1998, in *Teaching and Learning in the College Classroom* 2nd ed.: Needham Heights, MA, Simon & Schuster, pp. 391-414)

Instructional Dimension	Importance Shown by Rank with Student Achievement	Importance Shown by Rank with Overall Evaluations
Teacher's preparation; organization of the course	1	6
Clarity and understandableness	2	2
Perceived outcome or impact of instruction	3	3
Teacher's stimulation of interest in the course and its subject matter	4	1
Teacher's encouragement of questions, discussion, and openness to opinions of others	5	11
Intellectual challenge and encouragement of independent thought (by teacher & course)	13	4
Teacher's sensitivity to, and concern with class level and progress	10	5

"Instructional dimensions" are teaching traits that are detectable on formative evaluations. "Achievement" is a direct measure of learning such as performance indicated by exam scores or graded reviews of student work, such as written reports or portfolios. "Overall evaluations" are measures of general satisfaction, such as are found on summative tools like our own FCQs.

Feldman's meta-analyses show that the most important dimension to learning is the teacher's preparation and organization of the course. (Surprisingly this is only the sixth most important dimension in affecting overall evaluation.) "Good preparation" means that the course materials are structured so as to be cognitively accessible. Such accessibility is increased by requiring varied uses of the brain—confronting materials verbally, visually, in active discussion, in metaphors and analogies and by requiring repeated engagement of the same materials through various modes both inside and outside of class.

Accessibility is strongly influenced by clarity (#2 in importance to both learning and overall satisfaction), which is strongly related to the concept of audience awareness used by writers and speakers. The ability to build synapses depends upon an ability to construct interrelated patterns. The importance is easily grasped by comparing the effects of storytelling to poor lecturing. The former provides a pattern with continuity; the latter provides just facts. Consider which is retained longer.

Writing and discussing are ways of building more synapses by using visual, auditory and motor (kinesthetic/speaking) portions of the brain. The effects of writing/discussion and the requirements they place on the brain explain why cooperative learning produces about 0.5 standard deviations of improved learning beyond what would occur in a normal lecture-based classroom (Springer, L., Stanne, M. E., and Donovan, S. S., 1999, "Effects of small-group learning on undergraduates in science, mathematics, engineering and technology: a meta-analysis:" Review of Educational Res., v. 69, pp 21-51).

Bob Leamnson (1999, *Thinking About Teaching and Learning*: Stylus Pub., 169 p.) notes the importance of engaged emotions to learning. When brains are stimulated by interest and sense of importance, learning is easier to achieve. This is verified by the high rankings of items 3, 4, and 5 in the second column and items 4 and 5 in the third column of the table. These dimensions "hook" students by reaching them where their interests lie. Learning will extend those interests, and learning through time produces verifiable brain changes. Progressive brain changes validate the research models of Perry (see NN, v8 n1-n7), Blosser, and King & Kichener. All verify that ability to think at increasingly higher levels is a gradual change produced by education.

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Brain-based Learning 5—Academic Snake Oil?

Because learning at the level of brain biology involves the establishment and stabilization of synapses, then it is reasonable to expect that proposed teaching and learning methods touted as improvements should be relatable in some way to building neural connections. Some widely touted improvements have never proven themselves in any rigorous test nor have they been able to pass muster in any serious reviewed journal.

An extreme example began in the books of Georgi Lozanov (*Suggestology and Outlines of Suggestopedy*, 1978; *The Foreign Language Teacher's Suggestopedic Manual*, 1988) and has been further revived by Sheila Ostrander and Lynn Schroeder in *Superlearning 2000,* (1979 & 2000). A premise in these books is that study incorporating special background music results in greatly enhanced learning and retention. The authors' claims are indeed impressive. The 1979 edition claimed one can learn and retain 3000 new words in a foreign language per day; the recent edition still claims 1000. A spin-off phenomena, "The Mozart Effect," asserted that listening to music by Mozart could accomplish wonders from raising the IQ points of children to enhancing spatial skills. Subsequent investigators in The Journal of Aesthetic Education (Hetland, L., 2000, v34, n3/4, pp 105-148) and in Education Week (Zehr, M. A., 2000, v. 20, n. 4, p. 6) reported that "The Mozart Effect" fails to raise intelligence, SAT scores, grades or long-term spatial skills. Despite this fact, thousands of books and CDs on "The Mozart Effect" are still sold to avid buyers.

Closer to home in academe is the efficacy claimed for making use of varied kinds of "learning styles." These styles are termed "visual," "auditory," "kinesthetic," "analytic" *etc*. in accord with a modality for which a learner shows a particular preference. The diagnosis for preference is provided by a paper test. The hypothesis is that diagnoses followed by application of teaching the material in accord with each student's own learning style will result in better learning and retention. The attraction of attention to individual differences arises because: (1) individuals differ in preferences of instruction and learning; (2) awareness of difference should make educators sensitive to learners' needs (Jonassen, D., and Grabowski, B., 1993, *Handbook of Individual Differences Learning & Instruction*: Lawrence Earlbaum Assoc., 488 p.) The attraction is so strong that any questioning of the validity of learning styles hypotheses is akin to heresy in some circles. Yet, a reasonable question follows: "How does delivery of material in any particular learning style promote establishment and stabilization of synapses?" In "Different Strokes for Different Folks? A Critique of Learning Styles" (Stahl, S., American Educator, Fall, 1999, pp. 27-31.) the author reviewed the literature and found that practices which tried to match teaching styles to learning styles produced no convincing improvements in students' learning.

A similar disappointment is found when one tries to find evidence for the efficacy of "multiple intelligences" popularized by Harvard's Howard Gardner. Despite the popularity of Gardner's books, there is not a single credible journal article that shows that diagnosing a student's dominant "intelligence" and teaching to that "intelligence" results in any improved learning. Lack of proof of value has not prevented the North Central Association from specifying that: "Faculty members are exploring the uses of assessment in the context of research on multiple intelligences..." as a criteria for highest level success in assessment implementation. This shows the degree to which popular hypotheses can achieve credibility and mystique, even without proof. A popular book on a practice of dubious value will produce a large group of vocal supporters because the placebo effect alone will produce about 30% positive testimonials. Such testimonials do not constitute proof of value. It remains fair to ask: "How does delivery of material matched to any single intelligence mode promote development of stable neural connections?"

In summary, proven effective practices do make sense when considered at the level of brain biology. The same consideration can provide some defence against investing too much in "academic snake oil."

See other side for IMPORTANT announcements

Past issues of *Nutshell Notes* are available at http://www.cudenver.edu/public/OTE/nn/index.htm

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Volume 9 Number 4, August, 2001

Levels of Thinking and Educational Outcomes

Welcome back! Our two previous themes for several issues of Nutshell Notes were brain-based learning and levels of thinking as deduced by the Perry model. New faculty can find these past issues at the web site at the bottom of this page. In this issue, I'd like to tie together the two themes.

The Perry model is not the only model for levels of thinking; it is the product of the classical study that put all subsequent studies on firm footing. In Table 1 (reverse side of this issue) you'll find general equivalence of levels as proposed by various practitioners. This table was deduced by a team effort between Mike Pavelich of CSM and me, and both of us believe that there could be endless quibbling about just where all boundaries of equivalence lie. However, the important thing to note is that all the researchers cited have considered what happens to thinking as a result of education, all have come at this issue independently, some with very unique ideas, and all have concluded about the same thing as Perry—education that is successful changes the way people can think—and the more successful the education, the more sophisticated the thinking abilities of students become.

Classifications can be either discoveries or inventions. When a single worker proposes a classification, it is hard to tell whether it is a discovery of an important pattern or whether it is a mere invention that is molded by the means invented to test and to sort people into categories—people who would be sorted into different categories based upon other means. But when separate approaches yield the same sequence and kinds of categories, such as is the case here, this is a solid justification for stating that levels of thinking are no mere invention—they confirm discovery of thinking levels as one of the most important ever made in educational research.

Of the models shown in Table 1, that of King and Kichener (1994) is the most solidly backed by extensive data derived from students at many schools, from many disciplines, and levels through doctoral students. It shows that the primary demarcation between low-level thinking and high-level thinking lies in the ability to evaluate and to use evidence to confront open-ended problems. Many professors are familiar with the taxonomy of Bloom (1956—I'll summarize that next issue), and rely on it to produce high level thinking. Bloom's is a very useful cognitive taxonomy that links kinds of thinking to the kinds of questions capable of being addressed. Table 1 shows, however, that the upper stages of Bloom's taxonomy (and Blosser's model—also related to questioning) are reached by students with only intermediate level thinking capabilities—such students also do synthesis and evaluation, but they do it without sophistication and without skill in discriminating poor from good.

The replication shown indicates that brains themselves are changing in a consistent way as result of the educational process. DeBono's model is deliberate in forcing use of several brain parts. In the brain, learning is achieved by building neural connections, and autopsies done at UCLA reveal that graduate students have 40% more neural connections than do high school dropouts. The transition to Perry level 5, which is beyond that of most undergraduates, is a punctuated change that may reflect a major brain reorganization necessitated by prolonged challenge.

In developers' conferences and journals, we often hear about "teaching" and "learning," but seldom do we hear about "thinking." Most new college graduates have Perry stage 4 as their upper mode of comfortable operation, and they reach that on average, by making an upward move of only 1/3 division on the stage from freshman to graduate. Increasing the functional level of thinking is perhaps the best of all educational outcomes to aim for. Yet, this is a challenge only a few institutions have taken on. Our next issue will focus on ways to get higher level thinking as an educational outcome.

See other side for Table 1

General Equivalence of Some Models of Adult Thinking © E. B. Nuhfer

Emphases-->	**content-intensive emphasis**		**+ process-intensive emphasis**				**+ self-reflection**	**+ judgment from experience**	
Perry, 1968; 1999 2nd ed.	1. Basic Duality	2. Multiplicity Pre-legitimate	3. Multiplicity Subordinate	4. Relativism Subordinate	5. Contextual Relataivism	6. Commitment Foreseen	7. Initial Commitment	8. Multiple Commitments	9. Resolve
King & Kitchener, 1994	1. Knowledge experienced	2. Experience and authority as source	3. Unclear distinction of evidence from belief	4. Evidence accepted that fits established belief	5. Beliefs justified within context	6. Beliefs justified by comparing evidence and opinion	7. Beliefs justified based on relative value of competing evidence	This area is not a product of cognitive development alone. This is largely the realm described under "Emotional Intelligence" by Goleman, 1995. Actions and decisions are made with sophisticated frameworks of reasoning **plus** a **recognized** influence of an ethical framework, emotions and other affective factors	
Blosser, 1973; 1991	1. Cognitive Memory	2. Convergent Thinking	3. Divergent Thinking & 4. Evaluative Thinking (crude with poor justifications)		4. Evaluative Thinking (with better justifications)		4 Evaluative Thinking (with increasingly sophisticated justification)		
Bloom, 1956	1. Knowledge	2. Comprehension	3. Application 4. Analysis 5. Synthesis and 6. Evaluation (5 & 6 done crudely)		5. Synthesis (done better) 6. Evaluation (done better)		6. Evaluation (done with increasing sophistication)		
Biggs & Collis, 1982 "SOLO"	1. Pre-structural	2. Unistructural	3. Multistructural		4. Relational		5. Extended Abstract		
De Bono, 1985	White Hat (factual)	+ Black Hat, Yellow Hat (advocacy based on facts & evidence)					+ Green Hat (creative thinking)	+ Red Hat (emotional) + Blue Hat (conscious synthesis of all hats)	

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Volume 9 Number 5, September, 2001

Teaching to Elicit Higher Levels of Thinking (I)

In our last issue, we compared a number of models of adult thinking. In that issue we noted that an older cognitive taxonomy by Benjamin Bloom (1956) is probably the best known among college professors. Bloom's taxonomy in order of increasing levels of thinking level is shown in Table 1. We also saw in the last issue that even though students may be operating at a high level according to this taxonomy—grappling with issues that require synthesis and evaluation—this is no guarantee that these students are operating at the higher levels specified by more advanced models (those of Perry, King and Kichener, and Blosser). This is because the higher levels of these later models require one to do synthesis and evaluation with sophistication and skill, and such thinking differs greatly from doing these poorly. One can extend Bloom's taxonomy to drive thinking to Perry's and others' highest levels, but this requires use of appropriate rubrics (next issue) along with any high-level questions/problems.

If question type sounds like...	**...it is probably this Bloom's reasoning level.**
"Who ...?" or "What ...?"	**1. Recall** (remember terms, facts)
" Explain." " Predict." " Interpret." " Give an example." " Paraphrase...."	**2. Comprehension** (understand meanings)
" Calculate." " Solve." " Apply." " Demonstrate." " Given ___. Use this information to…."	**3. Application** (use information in new situations)
" Distinguish....." " Compare" or " Contrast" " How does ___ relate to___?" , " Why does ___?"	**4. Analytical** (see organization and patterns)
" Design...." " Construct...." " Develop." " Formulate." "What if....?" " Write a poem." " Write a short story….."	**5. Synthesis** (generalize/ create new ideas from old sources)
" Evaluate." " Appraise." " Justify which is better." " Evaluate ___ argument, based on established facts."	**6. Evaluation** (discriminate and assess value of evidence)

Table 1. Bloom's six levels of reasoning, with common question roots used to elicit the level. See also http://www.coun.uvic.ca/learn/program/hndouts/bloom.html for more explanation.

Students are better equipped to strive for higher order thinking when they know what it is. Otherwise high-level thinking can become an endeavor by teachers to which students will not intuitively respond well. All students have heard about "critical thinking," but ask your class to complete the sentence: "Critical thinking is _____...." Students' answers will usually be dominated by vague conjectures. Most tend to see an upper level challenge as a "hard question" but not as an item addressable by synthesis or evaluation. It is the rare student who displays familiarity with a formal framework of thinking, such as any model noted in the table in our last issue.

Despite limits noted, use of Bloom's taxonomy will carry efforts farther toward generating high level thinking than will efforts based on no framework or lack of any means to recognize discrete thinking levels. Bloom's levels are easily understood, and students can be quickly taught to employ them.

So as a start, give your students the Bloom taxonomy and web site in Table1. Have them generate their own questions for review sessions or quizzes, and have them label their own level of reasoning elicited by each question. Overwhelming emphasis of traditional education lies in the lowest Bloom levels, so students may have to struggle initially to produce high-level questions; they perhaps haven't seen many and have constructed none! By requiring practice, you will give your students two great gifts. One will be an initial recognition of specific qualities that constitute high-level thinking. Second will be a growing awareness for what one must actually do for oneself to progress higher in learning and thinking.

To reach high levels in meaningful ways requires a solid content foundation at lower levels. A need in curricular design is mapping of just when and how students will reach the higher levels. Introductory courses should address foundations, but upper level courses need rich engagements in high-level thinking.

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Teaching to Elicit Higher Levels of Thinking (II - Rubrics)

In our last issue we advised giving Bloom's taxonomy to students, along with the assignment to construct their own review or quiz questions and to recognize the levels of thinking addressed. We also cautioned that we cannot rely on the level of question being asked as the sole basis to assure us that students can exercise high-level thinking.

For example, consider this question: *Two viewpoints are expressed about exposure to normal amounts of radon gas: (a) fear of the "hazard" is unwarranted even though fear is fostered by the media, or (b) radon is a hazard that accounts for tens of thousands of deaths annually. What is the basis for each viewpoint, and which of the two controversies expressed has the best current scientific support?* This is a high-level question (level 6 on Bloom's scale) that we may presume demands use of evidence and evaluative thinking.

However, suppose we get the following answer from a student: *"The U.S. Environmental Protection Agency (EPA) conveys at their web site 'Radon Myths and Facts' (http://www.epa.gov/iaq/radon/pubs/myths.html) that '…all the major health organizations (like the Centers for Disease Control and Prevention, the American Lung Association and the American Medical Association) agree with estimates that radon causes thousands of preventable lung cancer deaths every year.' Therefore radon is a serious hazard, and option 'b' is correct."*

Although the question cries out for evaluative thinking, the student responds by operating from the low Perry stage 2 (prelegitimate multiplicity). Instead of presenting and evaluating evidence, this student has mistaken an appeal to authority as evidence—a mistake which not only reveals low-level thinking under all models (see *NN* v9 n4), but also invokes logical fallacy. We prevent such responses and any nebulous grading of open-ended questions by accompanying such assignments with clear rubrics.

Rubrics are the disclosed criteria to be used for evaluation, and rubrics are essential to elicit high-level thinking. Students cannot "rise to our expectations" unless we convey good criteria for what indeed constitutes a quality response.

To get a high-quality response, we need to accompany any high-level challenge with a rubric. So for our assigned question on radon, a suitable rubric might be: *In your answer, describe the physiological basis for defining radon as a hazard. Clearly separate testable hypotheses from advocacy as a basis for evidence. Clearly distinguish the evidence generated by the method of repeated experiments from that generated by the historical method. Use the definition of science as a basis to evaluate quality of evidence, and formulate a decision about the risks posed to you.* By supplying the rubric, we have clearly shut the door on simplistic appeals to authority, and we have opened the door to helping students meet our expectations at a Perry stage 6 or 7. Obviously, such a challenge is preceded by instruction in what science is and how it works, what radon is, how radiation causes damage, and when answers that contain ambiguity are often the most legitimate ones available.

Rubrics are not required for questions that test rote memorization or mere computation. One does not need a rubric to evaluate "What is the capital of Kentucky?" or "If a triangle has a base of 3 m and a height of 4 m, what is its area?" One probably doesn't need a rubric for most convergent questions. The fact that rubrics are not indexed in major "teaching tips" books for professors reveals how rarely college courses demand high-level thinking. Such thinking won't occur spontaneously; we have to build it in and convey what it is to students. Rubrics can inform both pedagogy and content. For example, those who do cooperative learning may visit http://www.stedwards.edu/cte/grub.htm to see a rubric that helps learning groups to function more effectively.

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Volume 9 Number 7, November, 2001

Teaching to Elicit Higher Levels of Thinking (III - Self-assessment)

In recent issues, we have suggested two ways to promote high-level thinking: (1) give students a framework such as Bloom's taxonomy or the Perry model (given in past newsletters at the web site below) and (2) employ rubrics that disclose the characteristics of high level thinking that you will use to mark graded work or assignments. Both the framework and the rubrics are needed. Only if we inform students of what we are trying to do are we likely to succeed in getting the results we want. This issue adds a third way: structure formal capstone exercises that require self-assessment for each major lesson or assignment.

Part of constructing meaningful educational experiences surely involves *getting in students' way*—by directing them to topics that they would not otherwise choose to study on their own and by using creative learning structures that students would not discover by themselves. Yet, no matter how effectively we teach or what pedagogies we employ, the only place that student learning occurs is in the brain of the student. This means that another essential facet of meaningful educational experiences involves our *getting out of students' way*. At some point, we need to structure some personal experience that guarantees introspective self-assessment—the experience that allows students to process learning by reflecting upon what they have learned, how they learned and how learning applies to them. Self-assessment can best be thought of as the capstone of any good lesson—an exercise that takes place after the content has been learned well enough to pass an exam or solve a complex problem.

Processing can certainly take place in the classroom. Good cooperative and collaborative lessons or well-designed problem-based exercises do this—but such processing is not enough. What is needed is some formal assignment that allows the student to get away from class, from orchestrated pedagogies and discussions, and to simply think, reflect and generate a product about what has been learned and what it means. Probably no institution does this better than Alverno College, a private school in Wisconsin. Over about thirty years, the faculty there perfected an approach that thoroughly incorporates self-assessment across the curriculum. The Alverno model of self-assessment consists of a framework that addresses: (1) observing oneself in action, (2) interpreting/analyzing one's own performance, (3) judging one's own performance and (4) planning for further development and growth. Each of these four components is evaluated based on a rubric that describes reasoning expected at three stages (beginning, intermediate and advanced) with criteria that together form an analog that is very close to the Perry model. The Alverno folks did not copy Perry's ideas--but they arrived at the same general *schema* as did Perry. This is expected based upon what we presented in *NN* v9 n4--namely that serious investigators who study levels of thinking and how to develop these in students all seem to arrive at common conclusions.

All self-assessments are done in writing and often through use of a self-assessment journal maintained by each student. Each major lesson may have a self-assessment assignment through which the student is guided by a series of prompts. The prompts are based upon the learning outcomes expected, the rubrics used for assessment of learning, and even the pedagogical design of a lesson. For instance, in a lesson that involved student groups' creating a product to reveal understanding of a discipline as a profession, the following prompts were included. "Describe your group's understanding and the product produced." "In what ways were you pleased or displeased with the product?" "Be specific and describe your personal contributions to the product's development." "Describe the interactions within your group and how feelings or emotions may have contributed to or hindered a 'breakthrough' moment." "Identify specific goals for improvement that you will try to achieve in a similar future project." Such efforts generate huge gains!

Have we got a deal for you in February?! Turn page to see this year's workshop on self-assessment and high level thinking! Also see the book discussion group announcement.

See other side for important announcements

Past issues of *Nutshell Notes* are available at http://thunder1.cudenver.edu//OTE/nn/index.htm

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Volume 10 Number 1, February, 2002

Teaching to Elicit Higher Levels of Thinking (IV - metacognition)

Quiz time!

1. What is the capital of Kentucky?
2. A rectangle has a base of 4 meters and a height of 3 meters; what is its area?
3. A piece of basalt weighs 6.8 grams in air and 4.5 grams in water; what is its bulk density?
4. Under what criteria might the human population of Earth be considered as excessive?
5. If today's population is hypothetically at 50% of the planet's capacity to sustain it, based upon the criteria you identified, formulate a plan of action that could prevent overpopulation.

In a recent workshop, I raised the issue: "Consider how it *felt* when you confronted each item; let's start with that first question." The student who had earlier answered, "Frankfort" broke into a big grin and said, "It felt pretty good!" We all laughed, knowing indeed how good it feels to have "the right answer!" Acquisition of low level knowledge feels good, and knowledge and comprehension are easy acquisitions to test for. Such seductive qualities make it easy to overemphasize low-level thinking in teaching and testing, and leave students and ourselves feeling a bit too satisfied in so doing.

As we proceeded, feelings changed. By the time we discussed the last item, things were more animated, but surely less comfortable. A 50% capacity and one doubling time of 38 years conveyed to students that they would likely be around to share the experience of an Earth with an exceeded supporting capacity. The final open-ended challenge had no neat short answer that gave instant gratification as "right," but it drove home the point that the most important real world problems do not have such answers. Any action plan would require going beyond objective facts and would involve urgency, emotions, values, compassion, denial, *etc*. The discussions brought such traits quickly to confrontations, and these did not feel so good.

The participants had just taken a whirlwind tour up the spectrum of Perry levels of thinking, and the exercise was one in **metacognition** — a self-assessment of one's own thinking process while involved in coping with varied challenges. Kruger and Dunning (1999) found striking consequences from lack of metacognitive awareness among college students: "*Not only do these people reach erroneous conclusions and make unfortunate choices, but their incompetence robs them of the metacognitive ability to realize it*." Their work showed that the very inability to perceive one's own approaches as inept produced an inflated self-assessment of one's own competence that precluded recognizing competence exercised by others. These researchers had just described the antithesis of lifelong learning — an inability to seize moments of crucial opportunity to learn from others. Such a handicap is not what we want to send forth in our graduates.

This imparts two educational obligations: (1) to provide open-ended problems for students to grapple with and, (2) to help students to understand their own thinking along with understanding of content. Doing an exercise such as described at the start of this issue is one way to introduce the concept of metacognition. The confirmed efficacy of single "critical thinking courses" has not been encouraging (van Gelder, 2000). It appears that metacognitive abilities develop better through experience from dealing with content in challenging ways than through short-term study of process alone. Critical thinking is identifiable through the process by which one engages an open-ended problem. Although acquisition of high-level thinking comes slowly, we must not underestimate the value of including open-ended challenges in our own single courses.

References Cited

Kruger, J., and Dunning, D., 1999, Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments: Journal of Personality and Social Psychology, v. 77, pp. 1121-1134. Available at **http://www.apa.org/journals/psp/psp7761121.html.**

van Gelder, T., 2000, The efficacy of undergraduate critical thinking courses: **http://www.philosophy.unimelb.edu.au/reason/papers/efficacy.htm.**

See other side for important announcements--**Getting on to PostExpress**

Past issues of *Nutshell Notes* are available at http://thunder1.cudenver.edu//OTE/nn/index.htm

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Volume 10 Number 2, March, 2002

Teaching for Higher Levels of Thinking (V - lessons from research)

There are myriad definitions of "critical thinking," but the consistence (see *NN* v9 n4) of researchers' findings provide the conclusions needed to illuminate practice.

(1) Critical thinking is identifiable through the process through which one engages an open-ended problem. This reveals an imperative to provide open-ended problems for students to grapple with so that they can practice process and develop skill. "Academically talented" students more often receive richer challenges, but the advice (Fiori, 1999): "Make the special challenge of your course the way in which the material is approached—not the quantity of material included" should inform the way we teach all students.

Disciplines have frameworks through which to address open-ended problems, so teaching students how to use these frameworks is an important part of teaching critical thinking. For instance, if we ask: "Are common levels of radon dangerous to homeowners?" a review of current literature will not yield a definitive answer. Yet, by using the framework of the methods of science, a student can evaluate current evidence and decide what constitutes the currently stronger hypothesis. This is not so different from using criteria to judge a play or a piece of artwork. Employment of frameworks provides valuable experience in understanding what constitutes a good reasoning process.

(2) A progression toward higher level thinking results from appropriate education. "Learning" is often too narrowly conceived of as "content learning." If professors want high-level thinking as a learned outcome, it must be deliberately cultivated. The acquisition of high-level ability takes time—more than a single course provides. On the average, Pavelich and Moore (1996) showed that deliberate efforts made within a block of content courses advanced students to higher levels than their peers attained in courses without such focus. Without our deliberate individual efforts, students will not realize much in the way of cumulative gains in high-level thinking. The research also alerts us to the need to design instructional challenges that match our students' stages of development. Inexperienced thinkers cannot handle open-ended challenges that involve much ambiguity. They struggle to produce what they think "the teacher wants" rather than to reflect on their own use of process, and tend to replace one authority with a (perhaps) better authority, which produces only the illusion of use of evidence with sophistication.

Transitions between some levels of thinking are not gradual or comfortable. Challenges that produce clashes with established beliefs, that displace cherished authority, or that bring grounding to overconfidence can produce discomfort, frustration, and even anger. If we tell students when to anticipate such side effects, they can better recognize and resolve such feelings.

(3) Critical thinking is a process. Therefore the emphasis of instruction must be on process and not just on knowledge or unexamined computations. The evaluation (or grading) must be mainly based on the process, as guided by a rubric (see *NN* v9 n6), and not just on the conclusion. In coaching and evaluation, we must be very careful to avoid pressuring students toward the conclusion that we favor. Teaching process requires that students use evidence to reach their conclusions, not ours. Fairness in grading dictates that we evaluate in accord with respect for that ground rule.

References:

Fiori, J., 1999, Teaching academically-talented students: National Teaching and Learning Forum, v. 8, n. 6.

Pavelich, M. J., and Moore, W. S., 1996, Measuring the effect of experiential education using the Perry model: Journal of Engineering Education, October, pp. 287-292.

This issue of Nutshell Notes is a condensation of Nuhfer and Pavelich (2002), "Using what we know to promote high level outcomes." The full article is available through UCD's institutional subscription to National Teaching and Learning Forum (v. 11, n. 3). Access this from your office through http://www.ntlf.com/restricted/.

See other side for important announcements--**RFP Summer Technology Conference**

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Volume 10 Number 3, April, 2002

Designing Experiences for Higher Level Thinking—Putting it All Together

Some time ago (1994, NN v.2, n7) we introduced knowledge surveys as a way to disclose the contents of an entire course to reviewers and to students, and then to verify in detail the content learning by students. Since that time, we have done quite a bit more with that tool (Nuhfer, E. B., and Knipp, D., 2002, The knowledge survey: a tool for all reasons: To Improve the Academy, v. 20, in press). A sample lesson that uses a knowledge survey as its basis ***is shown on the reverse side***. The first step is to **consider the learning outcomes** one wants to achieve, and then to **frame these as survey items** that could test achievement of the outcomes. Next the items can be **coded according to Bloom's levels** (*NN* v9 n5) to insure that the levels of challenge we intended are indeed conveyed. When we have such a detailed plan in writing, it enables us to **choose/ design pedagogical approaches** that make the most sense in achieving the learning. As we learned recently (*NN* v9 n6), asking a high level question does not guarantee that students will respond with high level thinking as an answer. In order to insure that this occurs, we must **convey rubrics** to students that disclose what we will look for to identify high quality in a response. As a capstone, **a self-assessment exercise** (*NN* v9 n7), possibly in the form of a self-assessment journal assignment, will help us mentor students to higher level thinking and allow them to reflect upon their own metacognition (*NN* v10 n1). The item numbers on the reverse side come from a 200-item survey of a course, and the figures show effects of the course in terms of content learning (Fig. 1) and thinking (Fig. 2). This example confirms what was taught, the levels of challenge, what students experienced, and the outcomes that resulted. What is most important, however, is that the outcome of such lesson design is a superior learning experience.

Consider what it takes to achieve this level of sophistication: only the will to construct a knowledge survey, which takes a few hours of one-time prep that incorporates test and quiz items already in most of our computers, and familiarity with the *Nutshell Notes* cited. For those who have doubted the value of such assessment, consider FCQ summative results and how looking at the work being done contrasts with rating professors against one another on a scale of 1 to 5.

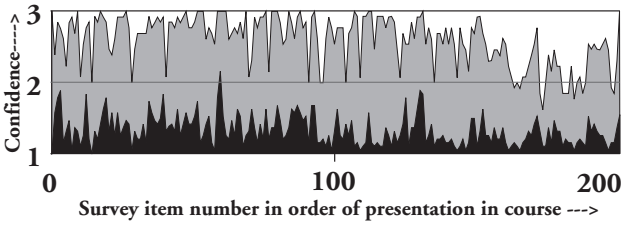

Figure 1. Pre- & post-course results of a 200-item knowledge survey Ordinate scales are from 1 (low confidence) to 3 (high confidence). The survey elicited confidence ratings to items (abscissa) in the order in which students encountered them in the course. The sample items 20-26 provided on the reverse side are from this same course. The lower darker area (on this and Figure 2) reveals the class averages of confidence to address each item at the start of class; the upper shaded area displays the ratings to the same items at the end of class.

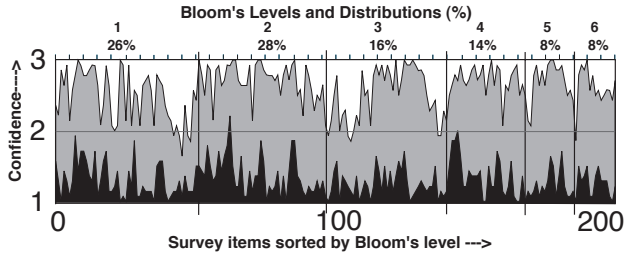

Figure 2. Levels of thinking represented in a knowledge survey. Data are from the same environmental geology class and knowledge survey shown in Figure 1, but here have been rearranged to present the course outcomes as a profile of levels of educational objectives (Bloom, 1956- see *NN* v9 n5) encountered in the course. The graph reveals that reduced learning in the final two weeks (Figure 1) occurred only in material typified by the lower Bloom's levels.

Next, look at the abscissa on the two figures and think "4-year curriculum" as opposed to "16-week course." If each faculty member in a program brings to a department meeting his/her knowledge survey of the courses required in the program, it is a splendid way begin to assess any program. Where this occurs, the design of curricular outcomes in content learning, levels of thinking, and design of experiences for students suddenly become clearly visible, and a superior curriculum design will result.

See other side for important announcements

A knowledge survey utilized in depth
Example: Lesson topic - The asbestos hazard

CHOSEN OUTCOMES (1) Apply the definition of science to a real problem and use the framework of the methods of science to recognize the basis for evidence and the difficulty associated with arriving at a sound conclusion. (2) To understand the asbestos hazard, what the material is, and how it became identified as a hazard. (3) To be able to evaluate the true risks posed to the general populace based upon what constitutes the currently strongest scientific argument.

CONTENT LEARNING and LEVELS of THINKING (Bloom taxonomy chosen)

Item #	Bloom Level	Content
20	1	What is asbestos?
22	2	Explain how the characteristics of amphibole asbestos make it more conducive to producing lung damage than other fibrous minerals.
23	3	Given the formula $Mg_3Si_2O_5(OH)_4$, calculate the weight percent of magnesium in chrysotile.
24	4	Two controversies surround the asbestos hazard: (1) it's nothing more than a very expensive bureaucratic creation, or (2) it is a hazard that accounts for tens of thousands of deaths annually. What is the basis for each argument?
25	5	Develop a plan for the kind of study needed to prove that asbestos poses a danger to the general populace.
26	6	Which of the two controversies expressed in item 24 above has the best current scientific support?

PEDAGOGIES – Numbers correlate with content items above. (20) Lecture with illustrations, crossword, short answer drill; (22) guided discussion with formative quiz; (23) demonstration calculation, handout and in-class problems followed by homework; (24) paired (jigsaw) with directed homework on web; (25) based on data taken from "24," teams of two reflect on two scientific methods and relative strengths weakness of each in this; (26) Personal evaluation of conflicting evidence submitted as short (250 word maximum) abstract.

CRITERIA FOR ASSESSMENT (Rubric) – Be able to realize the basis for distinction between types of asbestos. Understand the nature of chemical formulae that describe minerals. Clearly separate testable hypotheses from advocacy of proponents as a basis for evidence. Clearly distinguish the method of repeated experiments from the historical method in the kinds of evidence they provide. Use science as a basis to recognize evidence, and formulate and state an informed decision about the risks posed to oneself.

SELF-ASSESSMENT – What do you now know about asbestos as a hazard that you did not know before this lesson? You have investigated two competing hypotheses about the degree of hazard posed to the general populace, and you now know the scientific basis for each argument. Do you feel differently now about the asbestos hazard than you did before this lesson? Whether your answer is "yes" or "no," explain why. Describe some possible non-scientific factors that could affect the arguments presented by each sides of the argument. How do you now feel about the risks posed to yourself, and what questions do you still have? (from Nuhfer and Knipp, 2002)

BOOT CAMP for PROFS is ON! July 21-27 - see http://www.cudenver.edu//OTE/nn/vol6/6_6.htm

Dear Colleagues:

It has been my greatest pleasure and privilege to have been your Director of Teaching Effectiveness since July, 1992. I want to thank all of you for your outstanding dedication to students, to the enterprise of teaching, learning, and thinking, and for the support you have given to me both personally and professionally. May's issue, which will be in your mail box shortly, will be the last Nutshell Note I'll produce at UCD. In July, 2002, ten years to the date, I will assume the directorship for the Center for Teaching and Learning at Idaho State University in Pocatello, where I will manage several directors & their staff in space dedicated to faculty development and student academic support. The larger kinds of unit-level contributions that I've been invited to make there are not feasible here, but the excitement of expanded opportunity is balanced by an immense sadness in leaving you and this community. You have touched my heart in every possible good way. **Thank you!**

Sincerely, Ed

NUTSHELL NOTES

"Teaching tips in a nutshell" — The University of Colorado at Denver's One-page Newsletter for Teaching Excellence

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Volume 10 Number 4, May, 2002

ALERT: Lights Out in Teaching Effectiveness?

The content of this final *Nutshell Note* is furnished at the request of the Teaching Committee. The last issue (V 10, n 3, p 2) revealed that the Teaching Effectiveness director has been recruited away from UCD by Idaho State University. Questions looming before faculty here are: "Will there still be a UCD Office of Teaching Effectiveness?" and, if not, "What services are the most essential to retain?" Below is a list of the most routine services provided to faculty for many years. Faculty initiative actually started this Office, and services have come from its annual operating budget of about $26,000. Please express which services that you think are most important to retain to the Teaching Committee Chair, Mark Tanzer. **(email - mark.tanzer@cudenver.edu or phone 556 -6373)**. In order to retain any of these, it is important that you express yourselves.

(1) Newsletter Nutshell Notes Issues archived at http://thunder1.cudenver.edu//OTE/nn/index.htm provide a record of most activities of this Office since its founding. The newsletter now has a local distribution of 1600, and is accessed online by faculty from many other institutions. The major use is to convey information that is immediately practical and follows a carefully planned thematic structure to create a campus culture that is cognizant of current trends in teaching, learning and thinking.

(2) Major Thematic Workshops The director in consultation with faculty chooses themes for most major workshops. The first workshop given in 1993 verified the effectiveness of coordinating a development theme between newsletter and workshop. Resulting registrants totaled about 120. Following the workshop, 70 more requests resulted from UCD faculty for U of MN presenter Karl Smith's book. Smaller workshops and book discussion groups are also offered as result of interest and demand. These have included many workshops on alternative pedagogies such as case method, instructional technology, teleconferences, *etc*.

(3) Formative Survey with consultation. In terms of an hour spent, no service yields greater benefits. It is the first line of defense for a faculty member in trouble. Trying to consult without benefit of a formative survey is like trying to set broken bones without benefit of X-rays. Providing such services will require maintaining the NCS bubble sheet scanner hooked to a computer that is networked. Since early 1994, over 450 formative surveys were run, nearly all accompanied by individual consultation. When a faculty member invites this class survey, the results are usually waiting under her/his door at the end of class.

(4) Knowledge surveys, described at http://www.cudenver.edu//OTE/nn/vol10/10_3.html have been introduced as both an assessment and a teaching improvement tool. They were a major method used to assess NVTI courses, and became more widely used at UCD since 2000, particularly in the College of Arts and Media. In terms of student learning, research shows that the most important effort a faculty member can make lies in the planning and organization of the course. Knowledge surveys lay out an entire plan of content and disclose it to students. Once this plan is clearly seen, one can analyze the course in sophisticated ways that allow one to target levels of learning and verify that content is delivered at that level. This in turn permits selection of appropriate pedagogies and rubrics to assure that the chosen learning and

(Continued on back)

thinking outcomes are met. Finally, surveys given at the beginning and end of the course allow one to verify success at a level of unprecedented detail. These surveys currently require use of the same NCS bubble sheet scanner. (As an aside, other units rely on this scanner for grading tests and conducting various surveys.)

(5) Student Management Teams draw on the basic quality circle concepts of Demings and Juran, and allow them to be applied in the classroom (see http://www.cudenver.edu//OTE/nn/vol2/2_2.htm and http://www.cudenver.edu//OTE/nn/smt/smt.htm). Since 1990 many UCD faculty have used these, and so have faculty at over 400 other institutions. Many have published on the success of the method as a development tool. A bibliography of most of these reports is provided in A Handbook for Student Management Teams The Office funds four students at a rate of about $60/student for any faculty member who wishes to tune up their course or their teaching through employing a team.

(6) Boot Camp for Profs® is a week-long summer intensive program founded in 1993, and this coming year's camp is described briefly at http://thunder1.cudenver.edu//OTE/nn/vol6/6_6.htm. It has become a nationally famous program and has drawn instructors and attendants from over 100 institutions. It has been adopted in California for the past three years under the name Beach Camp for Profs, which is a shorter program focused on community college instructors. The program goes far beyond individual development and ties good practices into curriculum development and unit level (college and department level) assessment. It is highly effective, but not magic. Attendants must actually use what they learn in their practice in order to develop and reap the benefits. Over 95% do this, and many attendants have since won best-teaching awards, and some have even started faculty development offices at their own campuses.

(7) Requests for tangible assistance for teaching improvement are met occasionally based on available funds. This includes financial help to attend meetings and/or training sessions that have a focus on instructional enhancement, and assistance to buy software or expand office computer capabilities.

(8) Updating library resources We've updated holdings by purchase of all pertinent books published by Jossey-Bass, Oryx and Anker publishing—all major publishers of key literature on teaching effectiveness.

(9) National Teaching and Learning Forum This office provides a UCD institutional online subscription to "National Teaching and Learning Forum" that can be accessed only from on the UCD campus at http://www.ntlf.com/restricted.

(10) Unit level development involves the director working with departments and colleges on assessment and curriculum development. It produces a working plan so that a curriculum can deliver educational outcomes that single courses cannot. Topics addressed are goals in terms of faculty aspirations, disciplinary content learning, pedagogical approaches, student learning experiences, levels of thinking to be achieved at various curricular stages, and student self-reflection. These have been accomplished during unit-level retreats scheduled during the school year and by unit level teams sent to "Boot Camp for Profs."

the Center for Teaching & Learning

NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

Museum Bldg. 434, Campus Box 8010
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Volume 10 Number 5, September, 2002

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Unit Level Development: Why We Need to Think at Varied Scales

Welcome to ISU's one-page faculty development newsletter! I started *Nutshell Notes* in Platteville, Wisconsin, and ten years worth were written by me (Ed Nuhfer) at University of Colorado at Denver (UCD). Those archives remain accessible at http://www.cudenver.edu//OTE/nn/index.htm and should soon be duplicated here at ISU. Bookmark the UCD site for access for now.

William G. Perry Jr.* did pioneering work in the 60s at Harvard University on the stages of intellectual development of students that defined their ability to think according to discrete levels. Other workers investigated this same phenomena, and their findings replicated Perry's. A summary of the equivalence is shown in the table on the reverse side, and the implications that arise from this work are enormous for adult learners and higher education.

The most reasonable explanation for why varied workers can arrive at such similar conclusions is that education has a detectable effect on the brain at cellular levels. The brain learns by developing and stabilizing synaptic pathways. When a student persists long enough and confronts challenges that are part of a good plan to produce intellectual growth, a punctuated change occurs between Perry levels 4 and 5 that marks students' ability to effectively use evidence to solve open-ended problems. The ability arises only when the required synaptic pathways have been developed. The truly good news is that a student can literally "grow a brain," if he/she takes advantage of an educational program designed to facilitate the growth of the required neural networks. If the challenges are well planned and the student persists, the transition to higher level thinking will usually take place. Such thinking is not reserved for only "the gifted."

Open-ended problems are those that do not have specific right or wrong answers, but instead have reasonable or unreasonable ones. The process of confronting such problems involves formulating several sound working hypotheses and using evidence to discern the strongest among them. Most baccalaureate graduates do not possess this ability; they are stuck at level 4, which means that they cannot use evidence effectively or with sophistication.

Another profound outcome of this research is the indication that there are no shortcuts to acquisition of the necessary skills. This seems to be because required neural growth is not rapid enough to allow the challenges of any single course to produce the required result. Instead, the goal of high level thinking has to be reached through a series of courses, designed for this purpose, over several semesters—i.e. a curriculum. This is the primary reason that we need to begin thinking at scales beyond what happens to students in just our own courses, and begin to picture how our courses are part of an effort designed with our colleagues. We need to envision ourselves and our efforts as part of something larger, because we are ultimately in the business of credentialing: giving degrees, not just courses. Often these degrees, mostly derived from curricula at the departmental levels, have a larger scale signature that is imprinted by the general requirements of a college or university. The research presented here shows that we need to spend more planning than customary by having the necessary conversations with our colleagues for designing curricula that ultimately produce high-level thinkers. When this does not happen, the default is upper division courses that emphasize low level, closed-ended kinds of problems and programs that produce graduates stuck at Perry level 4 reasoning. Even the most difficult closed-ended challenges cannot produce graduates who can deal with real-life ambiguities.

"Assessment" describes a process by which a unit knows what it is about, why it has chosen particular content and learning objectives, and how it knows when the objectives are met—not just in content learning, but also in high-level thinking. ISU's Center for Teaching and Learning has tools that can help departments design sophisticated assessments. Call us!

See other side for Models of Adult Thinking Equivalence

*Quickly learn the Perry model! Go to http://www.cudenver.edu//OTE/nn/index.htm and look at v 8 n 1-7.

From Nuhfer, E. B., and Pavelich, M., 2001, Levels of thinking and educational outcomes: National Teaching and Learning Forum, v. 11, n. 1, pp. 5-8

General Equivalence of Some Models of Adult Thinking © E. B. Nuhfer

Emphases-->	**content-intensive emphasis**		**+ process-intensive emphasis**				**+ self-reflection**	**+ judgment from experience**	
Perry, 1968; 1999 2nd ed.	1. Basic Duality	2. Multiplicity Pre-legitimate	3. Multiplicity Subordinate	4. Relativism Subordinate	5. Contextual Relataivism	6. Commitment Foreseen	7. Initial Commitment	8. Multiple Commitments	9. Resolve
King & Kitchener, 1994	1. Knowledge experienced	2. Experience and authority as source	3. Unclear distinction of evidence from belief	4. Evidence accepted that fits established belief	5. Beliefs justified within context	6. Beliefs justified by comparing evidence and opinion	7. Beliefs justified based on relative value of competing evidence	This area is not a product of cognitive development alone. This is largely the realm described under "Emotional Intelligence" by Goleman, 1995. Actions and decisions are made with sophisticated frameworks of reasoning **plus** a **recognized** influence of an ethical framework, emotions and other affective factors	
Blosser, 1973; 1991	1. Cognitive Memory	2. Convergent Thinking	3. Divergent Thinking & 4. Evaluative Thinking (crude with poor justifications)		4. Evaluative Thinking (with better justifications)		4 Evaluative Thinking (with increasingly sophisticated justification)		
Bloom, 1956	1. Knowledge	2. Comprehension	3. Application 4. Analysis 5. Synthesis and 6. Evaluation (5 & 6 done crudely)		5. Synthesis (done better) 6. Evaluation (done better)		6. Evaluation (done with increasing sophistication)		
Biggs & Collis, 1982 "SOLO"	1. Pre-structural	2. Unistructural	3. Multistructural		4. Relational		5. Extended Abstract		
De Bono, 1985	White Hat (factual)	+ Black Hat, Yellow Hat (advocacy based on facts & evidence)					+ Green Hat (creative thinking)	+ Red Hat (emotional) + Blue Hat (conscious synthesis of all hats)	

Biggs, J. B., and Collis, K. F., 1982, *Evaluating the Quality of Learning*: London, Academic Press.
Bloom, B. S., 1956, *Taxonomy of Educational Objectives— The Classification of Educational Goals: Handbook I*. - Cognitive Domain, NY, David McKay.
Blosser, P. E., 1973, *Handbook of Effective Questioning Techniques*: Worthington, OH, Education Associates, Inc.
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Goleman, D., 1995, *Emotional Intelligence*: NY, Bantam.
King and Kitchener, K, 1994, *Developing Reflective Judgment*: San Francisco, Jossey-Bass.
Perry, W. G. Jr., 1999, *Forms of Ethical and Intellectual Development in the College Years*: A Scheme: San Francisco, Jossey-Bass (a reprint of the original 1968 work with some updates).

the Center for Teaching & Learning

NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

Museum Bldg. 434, Campus Box 8010
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Volume 10 Number 6, October, 2002

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So, What's the Best Method of Teaching?

This is not a trick question! We do know the answer! It has implications not only for what we do in the classroom, but particularly has implications for how we serve students at ISU under the various offices of student support housed in the CeTL.

Benjamin S. Bloom, the researcher most famous for his creation of "Bloom's Taxonomy" (a topic in an upcoming Nutshell Note), wrote another paper which is less well known: "The 2 Sigma Problem: The Search for Methods of Group Instruction as Effective as One-to-One Tutoring" (Educational Researcher, June/July 1984, pp. 4-16). As you may have deduced from the title, **the best known method of teaching is tutoring**. In fact, Bloom looked at many variables related to student achievement, and his findings have held up in subsequent research. Nothing trumps tutoring; the outcomes of tutoring are astounding.

If one looks at a "conventional classroom" that uses the traditional lecture approach (Bloom chose classes of about 30 students for his study), the outcomes of both learning and cognitive development of higher mental processes produced by such classes can be expressed as scaled in at the 50th percentile equivalent. By contrast, the outcomes of tutoring scale at close to 100% or about two standard deviations (2 σ) beyond the level of achievement in conventional classrooms! This achievement has further striking implications: students who learn through tutoring don't flunk out, stress out, or drop out. This means that many students who have been consigned to the categories of "low achiever," "not bright enough," or even "unteachable" are students who can, in fact, succeed.

Education is a partnership between teacher and student, and learning takes hard work. To succeed, there must be good-faith effort made by students; students have to show up for the tutoring and make honest efforts to learn. But if enough will is present in a student to assume adult responsibility for her/his learning, the odds are very good that a student who makes use of tutoring is going to succeed at a very high level. Tutoring is so effective because it is a form of active learning in which teacher and student are engaged in a dialogue. There is full access to nonverbal cues, opportunity for discussion, questioning, and constant ability to provide feedback, support, and correction.

Bloom's research also had interesting findings in the value of tutoring as an early intervention. Bloom found that only about 3 to 4 hours of tutoring used at the start of a course to enhance or refresh students' understanding of initial entry prerequisites allowed tutored students who took the examination on the first two weeks' course material to outperform, at about 0.7σ level, the students who experienced more general informal review.

Tutoring works, and for this reason ISU faculty should refer their students to the tutoring services available in mathematics, writing, English as a second language and in the various disciplines in content area tutoring available at ISU's CeTL. A directory to help facilitate access is provided on the back of this newsletter.

Of course, a pragmatic problem with tutoring is that one cannot operate public universities with a student-to-faculty ratio of one-to-one. But there are ways in which we can obtain greater gains in the group instructional environment of a classroom. One way is to adopt some cooperative learning strategies that allow students to tutor one another for short periods. These can boost achievement 0.5σ to 0.8σ beyond what a class would gain without such enhancements.

Can we ever hope to obtain, in the classroom, achievement that approaches the 2σ gains of tutoring? Research, in fact, shows that this can be done, but not simply through alternative teaching techniques alone. A systematic strategy called *instructional alignment* can produce such gains. This involves developing comprehensive sophistication in formulating instructional goals, matching instructional methods to both content and student audience, addressing levels of thinking with sophistication and providing both corrective action and opportunity for student self-assessment. Instructional alignment will be covered in a forthcoming issue of *Nutshell Notes*.

See other side for announcements and access to CeTL tutors at ISU

the Center for Teaching & Learning

NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

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Volume 10 Number 7, November, 2002

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Teaching, Learning, and Thinking through Writing

There are many reasons why writing is an indispensable avenue to education. Writing allows students to monitor learning and simultaneously engages the kinesthetic, visual, symbolic, and reflective portions of the learner's brain. Through written assignments, instructors can embed metacognitive activities within content-rich lessons.

ISU's Writing Center is housed in the Center for Teaching and Learning. It provides services at no charge to ISU students, staff, and faculty and employs tutoring (see *NN* v. 10 n. 6) as its primary method. Certified tutors will help with any writing project at any stage of the writing process. The Writing Center (1) assists students in improving the quality of any endeavor involving academic writing and (2) serves as a collaborative resource for faculty development. These services help students to write and reason effectively, and strongly support the development of writing abilities as a university-wide endeavor.

Student Support

Writing Center tutors work collaboratively with individual students. Examples of collaboration are

- — discovering topics and generating ideas
- — finding supporting materials
- — developing and organizing
- — revising
- — polishing and editing.

In addition to meeting the needs of students' course writing, the Writing Center also offers focused collaborative assistance with a range of writing problem areas such as mechanics, writer's block, essay test taking, and preparing statements for graduate and professional school applications.

The Writing Center also offers student tutoring online via our OWL (Online Writing Lab). The OWL is a virtual writing center where students can meet with a certified tutor in a chatroom and work on writing issues and writing projects. Access the OWL through http://webct.isu.edu/public/OWL/.

Writing Center hours in Museum 434 are Monday through Thursday, 9 am — 8 pm, and Friday, 9 am — 2 pm. OWL hours vary and are available by appointment as needed. Clients should call the Center at 282-3662 to make appointments for both face-to-face and online tutoring.

Faculty Development

The Director of the Writing Center provides collaborative expertise to help faculty with the following:

- — development of writing assignments appropriate to specific course objectives
- — creation of accurate and efficient instruments for evaluating student writing;
- — introduction of collaborative learning/writing strategies for students;
- — presentations and workshops to classes on writing strategies relevant to a given assignment;
- — workshops for departments or other faculty groups. Examples follow.

I. *Lessening the Paperwork of Grading* This workshop assists faculty in developing their ability to assess and evaluate student writing. It demonstrates how the ease and often the fairness of paper grading are largely dependent on the design of an assignment and its criteria for grading.

II. *Linking Critical Thinking Skills to Learning Through Writing* This workshop explains how writing shapes thinking and learning, and illustrates why it is important to design good writing lessons to advance critical thinking skills. Participants learn to use general principles for teaching through writing in the context of actual assignments. The workshop provides examples from across the disciplines and culminates with the design of a goal-specific writing assignment for one of their courses.

III. *SAGA: Short, Audience-Directed, Goal-Oriented Writing Assignments* The SAGA workshop incorporates the evaluative aspects of Workshop #1, as faculty discuss the ways in which short, directed writing assignments help their students meet goals and objectives for their courses.

Contact Steve Adkison, Writing Center Director, at 282-4024 or at adkistep@isu.edu for further information.

See other side for contents of latest issue of NTLF

the Center for Teaching & Learning

NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

Museum Bldg. 434, Campus Box 8010
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Education! So, What's the Brain Got to Do with It?

First, some announcements! Go to http://www.isu.edu/ctl/ then link to faculty and then to resources. You'll see that ISU is beginning to get a web presence in faculty development, largely due to the good efforts of ISU Professor Keith Comer, who worked on this a good part of last semester and got us nicely started. You'll find the complete archives of Nutshell Notes, a web version of the *Student Management Team Manual*, some resources on the meaning of student evaluations, and links to "National Teaching and Learning Forum." There will soon be links to a variety of external resources.

Next, with respect to teaching and higher education, recent advances in neuroscience have lent an air of both excitement and optimism. Prior to the mid-90's, few pedagogical proponents were able to evaluate practices in terms of how the brain worked. By 1998, The American Association of Higher Education was bringing the brain to the forefront of guiding practices for learning. The Joint Task Force on Student Learning (final report, June 2, 1998, available at http://www.aahe.org/teaching/tsk_frce.htm) drafted principles for practice that included the biology of the brain in its opening principles.

" 1. Learning is fundamentally about making and maintaining connections: biologically through neural networks; mentally among concepts, ideas, and meanings; and experientially through interaction between the mind and the environment, self and other, generality and context, deliberation and action."

"2. Learning is enhanced by taking place in the context of a compelling situation that balances challenge and opportunity, stimulating and utilizing the brain's ability to conceptualize quickly and its capacity and need for contemplation and reflection upon experiences."

This understanding has even been able to generate a thriving "Brain Store®" industry (see http://www.thebrainstore.com/store/) and for good reasons. Case Western's James Zull explains both the utility and the appeal: "…the biology of learning enriches teaching by making educational theory *more real*. It's one thing to have a theory that learners construct their own understanding by building on what they already know and quite another to actually see how this construction happens…." (Zull, J. E., 2002, *The Art of Changing the Brain*: Stylus, 263 p.)

Robert Leamnson, a professor of biology at University of Massachusetts at Dartmouth, packaged the information in a way that is both practical and inspiring in what is arguably the best book for practitioners to date. Leamnson describes learning simply: as the building and stabilization of synaptic connections. This simple statement leads to profound insights—practices that obviously help to build and stabilize neural connections will probably enhance learning—and practices that are not obviously related to building such connections merit viewing with some skepticism.

Further, the statement implies that education changes the brain of the student permanently. There is nothing trivial about what takes place in education, and nothing in the "real world" has more potential to transform so many lives for the better. Indeed, "…the way you approach the job of teaching will depend on whether you perceive before you brains that may be forever modified in response to your efforts." (Leamnson, R., 1999, *Thinking about Teaching and Learning: Developing Habits of Learning with First Year College and University Students*: Stylus, 263 p.). Because learning builds neural connections, one literally "grows a brain" as the result of sincere effort. Ability to learn is not fixed at birth, nor is it ever "too late." (See "It's Never Too Late: Developing Cognitive Skills for Lifelong Learning" Interactive Learning Environments, 2002, v. 10, n. 2 pp. 93-103 by Robert Leamnson.)

There is probably nothing more fundamentally important to a modern university educator than understanding how the brain works during teaching and learning.

Now, if this has inspired some interest, use brain to grasp page firmly, then rotate wrist.

the Center for Teaching & Learning

NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

Museum Bldg. 434, Campus Box 8010
Pocatello, ID 83209-8010
Volume 11, Number 2, March, 2003

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Assessment: Completing Goals with Learning Objectives

Because every unit here is now involved in some way with assessment planning, this is a good time to stress the operational differences between goals, learning outcomes and their relationships to assessment. Assessment of educational programs has a single purpose—namely to improve students' intellectual development and learning (see Palomba, C. A., and Banta, T. W., 1999, *Assessment Essentials*: San Francisco, Jossey-Bass, 403 p). "Student learning" remains the primary concern of departments and is commonly associated with acquisition of content knowledge, attitudes & values, and skills. Professors know their content well, and they understand the knowledge and affective traits that students must cultivate in order to perform well within the discipline and the professions that arise from it.

"Intellectual development" is a separate issue—namely an increasing ability of students to think—to use evidence and to successfully address open-ended problems. This is not well-addressed because there is no emphasis on adult intellectual development in most disciplinary curricula. As a result, fewer professors and administrators have engaged the key literature, which details the recognizable stages of higher level thinking, and the kinds of learning experiences needed to produce growth. (Major resources of "intellectual development" were given in *NN* v10, n5, and earlier issues summarized the research that established the Perry model—all accessible at the URL at the base of this newsletter.)

Goals are essential, and the language of goals describes results in such general terms that they often appear as phrases rather than complete sentences. Our ISU *Undergraduate Catalog* has twelve goal statements on pages 26 and 27— for example, Goal 5: "To understand how the physical sciences explain the natural world." Although goals are fundamental, if one has only the language of goals, it is impossible to assess anything. In order to do assessment, one must have an outcome, and in order to achieve an outcome, one must do something. Therefore the language of actions (verbs) pervades outcomes. Our own cited catalog pages reveal the reason that most universities have difficulty with assessment: there are too few action statements.

Let's take Goal 5: "To understand how the physical sciences explain the natural world." We can develop outcomes through questions that students who "understand" should be able to answer or tasks that students should be able to do.

1. **What specifically distinguishes science from other endeavors or areas of knowledge such as art, philosophy, or religion?**
2. **Provide two examples of science and two of technology and use them to explain a central concept by which one can distinguish between science and technology.**
3. **It is particularly important to not only know ideas, but also where these ideas came from. Pick a single theory from the science represented by this course (biology, chemistry, geology, or physics) and explain its historical development.**
4. **Provide at least two specific examples of methods that employ hypotheses & observations to develop testable knowledge of the physical world.**
5. **Provide two specific examples that illustrate why it is important to the everyday life of an educated person to be able to understand science.**
6. **Many factors determine public policy. Use an example to explain how you would analyze one of these determining factors to ascertain if it was truly scientific.**
7. **Provide two examples that illustrate how science employs quantitative reasoning.**
8. **Contrast "scientific theory" with "observed fact."**
9. **Provide two examples of testable hypotheses.**
10. **"Modeling" is a term often used in science. What does it mean to "model a physical system?"**
11. **What is meant by "natural and physical science?"**

Voila! We now have many options through which to assess the meeting of our goal. We can assess our students' abilities to do these things by knowledge surveys, examinations, portfolios, essays, self-reflection journals, projects, *etc.*

These objectives came from about three two-hour meetings (not here—YET!) from the professors who taught the goal's courses. They agreed upon these outcomes as reasons that a student should take a science course. These questions involve science literacy—understanding what science is, and how it works as a means to explain the physical world. The result is that evaluators, teachers, and students can understand what the course is supposed to do. Disciplinary content can be used and learned as the vehicle to get these outcomes, but the purpose of the course *as a general educational requirement* is now operational and assessable. A new professor or adjunct can easily understand that teaching any course that meets the goal requires expected outcomes as a responsibility, and subsequent faculty can better rely on the assumption that certain things have been done in the course. Such objectives help us to focus and to deliver improved education.

Past issues of *Nutshell Notes* are available at **http://www.isu.edu/ctl/nutshells/index.html**

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NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

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Curbing Plagiarism: Teaching, not Preaching

Academic honesty is fundamental, and responsibility for nurturing it rests with all students, faculty, and administrators. The National Program of Writing Program Administrators (WPA) gives a simple definition of plagiarism: *In an instructional setting, plagiarism occurs when a writer deliberately uses someone else's language, ideas, or other original (not common-knowledge) material without acknowledging its source*. Such plagiarism is an assault on credibility, respect, and even morale. Whenever it occurs, it makes the day a bit darker for all concerned. Sadly, we cannot prevent deliberate attempts to deceive and exploit. In such cases, our options are usually limited to catching plagiarism when it occurs (internet plagiarism-detection tools are helpful-see http://www.canexus.com/eve/index.shtml) and enforcing an appropriate penalty—ideally one already codified in some institutional governance document.

Braumoeller and Gaines (2001, American Political Science Association, http://www.apsanet.org/PS/dec01/braumoeller.cfm) deduced that one paper in eight submitted in an introductory course involved plagiarism. But all transgressions are not deliberate; many more arise from lack of understanding or skills. These call for response through instruction rather than through punishment. Studies indicate that stern warnings and threats do not reduce plagiarism, but instruction does. Thus teaching, not preaching, seems to be the more effective prevention.

Where data is collected, minority students seem disproportionately more involved in plagiarism cases. This reflects a fact that not all cultures understand the cherished academic concept of the propriety of ideas or the relationship between the student and "authority." Even students who have internalized the concept may still be unskilled in the process of integration of material and attribution of sources, ideas and facts. After we have mastered formal academic writing, it is easy to forget the process or difficulty through which we obtained mastery, and thus it is too easy to forget to convey to students the details needed to avoid problems. Consider the following:

— How does one distinguish between common knowledge and that which requires attribution?

—How does one paraphrase or summarize without plagiarism?

—How does mastery of embedded clauses, and passive verbs, impact this process?

—When should one use a direct quotation, instead of a paraphrase or summary?

—How does one integrate voices of others into one's own work when one is not clear about what "voice" is?

—How does one "know" when a synonym used in a paraphrase reflects the author's intention or produces another resonance?

—What are signal phrases, and how do they differ in MLA , APA or some other styles?

—What are the mechanics involved in constructing a References Cited or References page, and what is the acceptable relationship between entries and the in-text citations?

Accusations of suspected plagiarism can bring horrific consequences for the accused, immense drain on morale and personal time of faculty directly affected and those indirectly affected as members of committees who must review cases. Such cases sometimes strain even legal and financial resources of institutions. (See "Honor for Honor's Sake?" Chronicle of Higher Education, May 3, 2002 p. A-35). Class time spent on points such as those above is worthwhile, because that time will be minimal in comparison to that dealing with the fallout that even one plagiarism case will require.

One should try to design assignments in ways that make plagiarism difficult. St Thomas University's Russ Hunt, with his tongue-in-cheek title "Four Reasons to be Happy About Internet Plagiarism" (http://www.stu.ca/~hunt/4reasons.htm) makes the point that the technology that produces convenient opportunities for plagiarism also produces incentive for us to design assignments that produce better learning outcomes.

Other useful resources

(1) "Defining and Avoiding Plagiarism: The WPA Statement on Best Practices" http://www.ilstu.edu/~ddhesse/wpa/positions/WPAplagiarism.pdf (2) Indiana University's "Understanding Plagiarism" http://www.education.indiana.edu/~frick/plagiarism/ (3) The UK's Learning and Teaching Support Network"A Briefing on Plagiarism" http://www.ltsn.ac.ukapplication.asp?section=generic&app=resources.asp&process=full_record&id=10). (4)The web page for the Center for Academic Integrity http://www.academicintegrity.org/ at Duke University's Kenan Institute for Ethics contaims links to articles about plagiarism and other ethical issues.

(**This issue produced with Lynn Leonard of ISU's ESOL Program.**)

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NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

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Faculty Development Services at ISU's Center for Teaching and Learning (CeTL)

Idaho State University's Center for Teaching and Learning (CeTL) houses faculty development services, student support services in form of tutoring, and university academic courses such as first year seminars, clustered learning, honors and college learning strategies courses. Together, the student support services of Content Area Tutoring, the Writing Center, the Mathematics Learning Center and English for Speakers of Other Languages (ESOL) provide one of the strongest assets for student success provided by any university in the country. Housing of student support services together with faculty development in one Center provides opportunity for coordination and conversations that are rarely held where these entities are housed separately. Details on all of these services are accessible through one web link at http://www.isu.edu/ctl/.

This *Nutshell Note* focuses on opportunities for faculty development, and the following issue will summarize the support services provided to students. Faculty development options described below have been available for less than a year at Idaho State University (ISU), so this issue will help inform those who have not yet drawn upon these services. All are already in use by faculty, instructional staff, and teaching assistants.

(1) Newsletter *Nutshell Notes* issues are archived at http://www.isu.edu/ctl/nutshells/index.html . The newsletter was begun in Wisconsin in 1991 by ISU's current CeTL Director, and issues were numbered and archived beginning in 1992. *Nutshell Notes* now has a local distribution of 1800 at ISU and is also accessed on-line by faculty from many other institutions. The major use is to convey information that is immediately practical and over time produces a campus culture that is cognizant of current trends in teaching, learning and thinking.

(2) (February's thematic workshops are designed by the director in consultation with faculty. The first workshop given at ISU in 2003 with 110 registrants verified the desire by faculty for such thematic campus-wide events focused on instruction. Following the workshop, additional requests resulted from ISU faculty for presenter Bob Leamnson's book, *Thinking about Teaching and Learning*. In 2004, our featured presenter was Dr. Barbara Millis from the United States Air Force Academy. Dr. Millis is an internationally known expert on cooperative learning and first author of *Cooperative Learning for Higher Education Faculty* with accounting professor Philip G. Cottell, Jr. Once again, the authors book will be provided to ISU attendants as part of the workshop. As result of apparent need in assessment of student learning, the director invited Dr. Peggy Maki in 2005. Maki, the former assessment director for the American Association of Higher Education, presented to over 120 faculty who also received Maki's book, *Assessing for Learning*. This workshop provided one of the punctuated events for ISU, and created a critical mass of individuals who understood what asseement was about and the value of it in improving education. Our most recent event in February of 2006 focused on promoting higher levels of thinking. This workshop, Building and Assessing Students' Critical Thinking Skills by Dr. Susan Wolcott, drew the highest number of attendants yet. Participants received both a copy of *Developing Reflective Judgment* by Drs. King and Kitchener and a pre-print of a book on steps to higher level thinking in preparation by Dr. Wolcott.

(3) Smaller workshops and programs offered throughout the year result from expressed need and interest. Our current workshops in fall of 2003 have been based on largely on case study discussions (mostly from *Teaching and the Case Method,* third edition) directed by a variety of ISU faculty. In spring, 2004, these workshops will continue along with a continuing workshop/support group in writing for scholarship based on the book, *Professors as Writers*, by Robert Boice. Scheduled events should be accessible at http://www.isu.edu/ctl/news/calendar.html.

(4) Formative survey with consultation provides some of the most outstanding benefits possible for a short investment of time. It can be the first line of defense for a faculty member in trouble or one of the best ways for effective teachers to validate successful practices. The process requires about twenty minutes of class time to complete a formative survey (http://www.isu.edu/ctl/facultydev/extras/60%20pt.htm). Our formative survey provides a profile of one's pedagogical "fingerprint." This particular survey is based on research of practices known to promote learning in both lecture-discussion and cooperative/collaborative group instructional modalities. The results are returned to the faculty member and are owned by that faculty member. No disclosure to third

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parties is provided by the Center. The survey results are examined by the faculty member and, normally, a follow-up consultation that takes about twenty to thirty minutes occurs with the director of CeTL. Research shows that formative surveys followed by consultation result in course changes that greatly improve both faculty and student satisfaction (see http://www.isu.edu/ctl/nutshells/old_nutshells/1_5.htm).

(5) Knowledge surveys (see http://www.isu.edu/ctl/facultydev/KnowS_files/KnowS.htm) are both an assessment and a teaching improvement tool. In terms of student learning, research shows that the most important effort a faculty member can make lies in the planning and organization of the course. Knowledge surveys provide an entire plan of content and disclose it to students. Once this plan is clearly seen, one can analyze the course in sophisticated ways that allow one to target levels of learning and verify that content is delivered at that level. This in turn permits selection of appropriate pedagogies and rubrics to assure that students meet the chosen learning and thinking outcomes. Finally, surveys given at the beginning and end of the course allow one to verify success at a level of unprecedented detail. At ISU, these surveys may be done in-class or on-line through WebCT. The knowledge survey itself is a highly reliable student ratings instrument. It is not a substitute for tests and exams and does not sample the same information. Instead it supplies different information that is more useful for the purpose of designing classroom experiences that produce better learning improvement. Correlation of knowledge survey results with tests of known good reliability generally show correlations in the range of r = 0.2 to 0.5. Correlations with faculty made tests of unknown reliability can yield any correlation--all of which are meaningless from a research viewpoint, but that can be highly useful in alerting faculty to address the reason for such an unanticipated result, which is almost always improved through alternative instructional practices and developing better skill in test preparation.

(6) Student management teams draw on the basic quality circle concepts of Demings and Juran, and allow them to be applied in the classroom. Since 1990, faculty at over 400 other institutions have used these and verified their effectiveness. Many professors have since published on the success of the method as a development tool. A bibliography of most of these reports is provided in *A Handbook for Student Management Teams* (http://www.isu.edu/ctl/facultydev/webhandbook/smt.htm). The Office funds four students at a rate of about $50/student for any faculty member who wishes to tune up their course or their teaching through employing a team.

(7) Boot Camp for Profs® is a weeklong summer intensive program founded by the CeTL director in 1993. The most recent camp is described briefly at (http://www.isu.edu/ctl/nutshells/old_nutshells/6_604.htm). At least one camp will be held again in 2005, but dates and locations are still in planning stages. It has become a nationally famous program and has drawn instructors and attendants from over 100 institutions. The program goes far beyond individual development and ties good practices into curriculum development and unit level (college and department level) assessment. Many attendants have subsequently won best-teaching awards, and some have started faculty development offices at their own campuses. By end of July, 2004, over fifty faculty from ISU will have attended.

(8) National Teaching and Learning Forum® This office provides ISU with an institutional online subscription to "National Teaching and Learning Forum" that can be accessed only from computers on the ISU campus at http://www.ntlf.com/. This is an outstanding newsletter and carries with it a very useful searchable web site.

(9) Unit level development involves the director working with departments and colleges on student learning, assessment and curriculum development. It produces a working plan so that a curriculum can deliver educational outcomes that single courses cannot. Topics addressed are goals in terms of faculty aspirations, disciplinary content learning, pedagogical approaches, student learning experiences, levels of thinking to be achieved at various curricular stages, and student self-reflection.

For further information, use the contact information provided in the *Nutshell Notes* banner head.

updated June 7, 2006

the Center for Teaching & Learning

NUTSHELL NOTES

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Student/Faculty Services at ISU's Center for Teaching and Learning (CeTL - Revised 2006)

This issue of *Nutshell Notes* summarizes the services and academic courses provided to students and the larger campus communities. It follows last month's summary of faculty development services. More information is available at the Center's web site at http://www.isu.edu/ctl/nutshells/index.html. These two issues should help acquaint the entire campus with the services and opportunities provided by this unique Center.

Content Area Tutoring ("CAT," Contact at 282-4823, HaydieLeCorbeiller, ctl01@isu.edu) offers free one-on-one and small group tutoring funded by student fees, to full-time students of Idaho State University. The program also provides students with employment opportunities, allowing peer tutors to share their knowledge and learning strategies with others as they develop their own tutoring skills and progress towards certification through the College Reading and Learning Association (www.crla.net). Tutoring support is offered for all undergraduate courses except writing and math, which are handled through the Writing Center and the Math Center (see below). Services are provided at both the Pocatello and Idaho Falls campuses.

English as a Second Language/ English for Speakers of other Languages ("ESL/ ESOL," Contact at 282-3903, Lynn Leonard, leonlynn@isu.edu) The English as a Second Language and English for Speakers of Other Languages (ESL/ESOL) program assists undergraduate and graduate students at ISU for whom English is not the first or primary language. The program also serves visiting scholars, faculty members and participants in special training programs who seek to strengthen their skills in American English and American cultural awareness.

The program offers a wide range of direct services on the Pocatello and the Idaho Falls campuses: one-on-one instruction by appointment, small group workshops, Accent Modification Evaluation and follow-up, online writing lab and online research resources. We provide credit courses (ENG 100, AMST 100), cultural excursions and cultural exchanges, skills assessments (SPEAK), problem identification, and remediation, language and strategy support for International Teaching Assistants.

Program staff also provide informational resources, community workshops, consultation, training to assist in faculty development, future teacher education, international exchanges and interinstitutional agreements.

The staff helps cross-train Writing Center tutors and Math Tutors in ESL issues and strategies, and works in professional collaboration with Janene Willer of the Department of Communication Sciences to train graduate clinicians in multilingual/multicultural competencies through the Accent Modification Evaluation service. The program administers the SPEAK assessment in support of the ISU Graduate Office, and provides one-on-one consultations to enhance communication effectiveness of International Teaching Assistants, Research Assistants, and Graduate Assistants. The staff serves on various campus committees, such as the Diversity Committee, International Student Support Team, and as advisors to various graduate students with related research interests. The program assists colleagues across the campus in hosting and informing international visitors to ISU with the goal of exploring and developing international collaboration and exchanges to benefit the university and the community.

Mathematics Center (Contact at 282-4023, Cathi Kunicki, kunicath@isu.edu) The Math Center offers free mathematics tutoring to ISU students at the Pocatello campus and at other ISU centers. Adjunct instructors, graduate students and certified tutors help students in undergraduate math and math related courses. The purpose of the Mathematics Center is to help students improve their mathematical skills, to increase their confidence to use mathematics and to understand and apply mathematical concepts.

In addition to meeting the needs of students through tutoring in the Math Center, the Director of the Math Center offers focused assistance with areas such as math anxiety, study techniques, and test taking strategies through one-on-one counseling and through a one credit eight week course, College Learning Strategies for Mathematics.

Math tutors are not substitutes for instructors. Tutors do

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not teach/reteach a course to students, nor will they do their homework or tests for them. Students need to attend their class, read their textbook, try the assigned homework on their own, come with specific questions to ask the tutor, and show the work that they have done. Students should also bring their class notes to the Math Center.

The tutor first assists in ways that emphasize correct approaches and help detect causes of possible mistakes. The tutor then works through examples with the student and gives suggestions about how to approach such problems. Math tutors help students understand by asking questions to clarify what they know and to determine concept mastery.

Writing Center (Contact at 282-4024, Steve Adkison, adkistep@isu.edu) The Writing Center offers a variety of services at no charge to ISU students, staff, and faculty. Our certified tutors can help with any writing project at any stage of the writing process. The Writing Center operates according to a twofold principal mission. The first is to assist students in improving the quality of the academic writing done in courses at all levels; the second is to serve as a resource for university faculty, and to support writing across the curriculum in the General Education courses and within the disciplines. This twofold principal mission reflects the need for students to write and reason effectively, and strongly supports the development of writing abilities as a university-wide endeavor.

In accomplishing the first part of this mission, Writing Center tutors work individually with students on their writing assignments, covering all phases of the writing process:

- discovering topics and generating ideas;
- finding supporting materials;
- developing and organizing;
- revising;
- polishing and editing.

In addition to meeting the needs of students' course writing, the Writing Center also offers focused assistance with problem areas such as writer's block, essay test taking, and mechanics, as well as collaborative aid in application and exam preparation for graduate and professional schools and general employment.

In accomplishing the second part of this mission, the Director of the Writing Center provides the collaborative expertise to help faculty with the following:

- development of writing assignments appropriate to courses in the various disciplines;
- creation of accurate and efficient instruments for evaluating student writing;
- introduction of collaborative learning strategies for students;
- presentations to classes on writing strategies relevant to a given assignment;
- editorial assistance for professional, grant, and proposal writing.

College Learning Strategies ("CLS," Contact at 282-5161, Kristine Rudd, ruddkris@isu.edu) The program offers a one-credit course, College Learning Strategies (ACAD –101). The areas covered in the course include learning styles, time management, note taking, reading, memory, test taking, controlling test anxiety, and critical thinking. Students may also make individual appointments for tutoring to develop study strategies relevant to their courses. In addition, the Coordinator provides specific learning strategy topics presented in workshop formats to campus classes, for campus groups, and at residence halls.

First Year Seminar ("FYS," Contact at 282-3933, Missy Cummins, cummmeli@isu.edu) is a course that welcomes students into the learning community of Idaho State University by providing an introduction to campus resources and the concepts of higher education. FYS encourages and supports students' academic success and engagement with the university culture. Participation in FYS helps students to discover how to be in charge of their own education, to embrace the meaning and value of becoming lifelong learners, and to focus on collaborative learning and active engagement.

Clustered Learning for Academic Student Success ("CLASS," Contact at 282-3933, Missy Cummins, cummmeli@isu.edu) is a program designed to enrich students' academic experience. CLASS students become a learning community by enrolling in a cluster of courses, where they may develop study groups and long-term supportive friendships. Faculty who teach in a CLASS cluster have demonstrated specific interests in fostering a learning community.

University Honors Program (Contact at 282-4945, Cindy Hill, hillcynt@isu.edu) The Honors program at Idaho State University is an academic learning community that offers a broad range of enriched educational experiences, typically found at a small private college, for talented undergraduate students.

Eligible students may apply to the University Honors Program or simply enroll in selected honors courses (please check the Honors course listings at http://www.isu.edu/ctl/honors/honors1.html). New freshmen must have a 3.6 high school GPA , a 25+ composite ACT, and submit a writing sample and an application. Continuing ISU students must have a 3.5 GPA and submit the writing sample and application. Once accepted into the program, students are eligible to enroll in honors courses, receive honors scholarships, attend regional and national honors conferences, submit poetry, essays, and other writings for publication in a regional student journal, serve on the University Honors Committee, and graduate with honors. Graduates of the University Honors Program are recognized at graduation and on their official transcripts.

the Center for Teaching & Learning

NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

Museum Bldg. 434, Campus Box 8010
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Toward a New Year — Strengthening Syllabi

Happy Holidays! You'll likely find this December issue (syllabi) and the January issue (knowledge surveys other side) resting in your mailbox just before you prepare the initial documents for your spring course. These can help improve courses dramatically.

A good syllabus can surely prevent many tears and frustrations. The syllabus is the first and most important written document our students receive in a course. Like a good road map, it can align students' efforts with our intentions and set the tone that we want as a signature for the course.

ESSENTIAL LOGISTICAL INFORMATION is important to prevent crises that otherwise arise from the most simple omissions. Check your syllabus to be sure that you have included the following: **(1)** your phone, e-mail, office number and office hours; **(2)** textbook and/or outside materials needed along with a reminder to bring these to class if they will be used there; **(3)** list of required readings and deadline dates for reading these; **(4)** Any instructional technology requisites such as a class WebCT site or any supporting web site provided by the textbook publisher; **(5)** pre-requisite courses or skills needed to encounter the material; **(6)** Policy for absences; **(7)** policy for missed tests & quizzes; **(8)** policy for late work; **(9)** Policy for extra credit work; **(10)** Grading method and scale; **(11)** call to be made aware of students' special needs that might need accommodation.

DESCRIPTION of COURSE CONTENT should be consistent with truth-in-advertising in the Catalog. It doesn't hurt to copy the catalog description into the syllabus. If the course meets a Goal Requirement, address the goal and what it means in terms of expected learning outcomes. If the department has particular written expectations of this course in terms of learning outcomes (*i.e.*, preparation for licensing exams, for entry into a higher level course or as a capstone course) disclose this in the syllabus. Information about content that often proves useful for students includes: **(1)** types of knowledge and skills to be developed; **(2)** the logic for sequence of content; **(3)** chosen major learning outcomes for the course and why you chose these as most important **(4)** how the course relates to the content, primary concepts and principles of the overall discipline; **(5)** why you are enthused about this content and **(6)** why students should want to master it. Actual content can be disclosed to great advantage through a Knowledge Survey (next issue - other side).

CONTENT DELIVERY can occur through many different pedagogical methods (*i.e.* lectures, discussions, collaborative work, written and/or oral projects, role play, case discussions, *etc.*). Many students are accustomed to lectures; but other modalities of delivery are new to them. If you use these, it is crucial to describe in a sentence or two about why these have particular advantages to their learning and how to learn through these less familiar alternatives.

TELL SOMETHING ABOUT YOURSELF because you will be the most important person in this course to each student. Useful things to disclose are **(1)** your core values about teaching and learning (which you should be able to transfer directly from your own written teaching philosophy); **(2)** your own experience with the content and how it has been worthwhile for you to study this particular area of scholarship; **(3)** the criteria you use as a basis to assess whether the course has been successful. If you have recently taught the course, look back over your last course schedule and student comments, and pay attention to areas that went well or did not go well—especially with respect to your own assessment criteria. Use this experience as a basis to improve parts of the syllabus and your plan for the course itself.

Finally look at the tone overall conveyed by the document. For those of us who have taught for years, transgressions by students that irk us can find their way into syllabi in ways that scold new students for the transgressions of others. That immediately gets in the way of setting the welcoming atmosphere we probably intend to convey.

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Build a Knowledge Survey for Better Learning

Happy New Year! Here is an equation for 2004: **Better Organization = Better Learning.**

Those skeptical of the statement can consult a particularly revealing document (Feldman, K. A. (1998). Identifying exemplary teachers and teaching: evidence from student ratings. in *Teaching and Learning in the College Classroom* 2nd edition, K. A. Feldman and M. B. Paulsen, (Eds.) Needham Heights, MA: Simon & Schuster, 391-414) complete with a murderous array of statistics that proves that the most important way we can spend our time to generate improved learning is to spend that time on preparation and organization of the course. Interestingly, in teasing apart traits that lead to student learning and student ratings ("high student evaluations"), we find the most important practice to produce enhanced learning is only the sixth most important in producing high student ratings. (Resolution is a discussion for another day unless you wish to wade now through a very long summary about student evaluations at our own site at http://www.isu.edu/ctl/facultydev/extras/student-evals.html.)

When we think our organization is clear, students usually do not. Harvard's Phil Sadler, (1992, Derek Bok Center's videotape, "Thinking Together: Collaborative Learning in Science," explains how this occurs: "When you learn to teach a subject, just struggling with how to present it, where you're sort of relearning it yourself, that's when students gain the very most from a lecture. Once you've really got it down and you see all these beautiful connections that you didn't see before, you're well beyond the level of the student." We see our organization; they don't, unless we bring it to their level. One way to bridge the gap is to present our organizational plan completely in writing and to let students engage it at their pace in ways that promote their learning.

The concept behind a knowledge survey is simple. It is a written document constructed through a logic that begins with course goals, then outcomes that are fleshed out by what students should be able to do as a result of successfully meeting an outcome. It is a document that discloses the entire course and takes detailed before/after snapshots of students' perceptions of their learning. If you've taught a course before, rudiments for your first crude knowledge survey are likely already in your computer. Copy all your quiz, test, and review questions into one giant file, in the order you intend to cover these topics in the coming days ahead. See if it is, in fact, organized so as to cover and make explicit your stated goals and outcomes. If not, make the needed changes and additions to do so. You now have a "monster exam" that covers the entire course.

Students don't merely retain it as a study guide, they interact with it and produce a scaled record based on their confidence with present knowledge. Students mark an "A" in response to an item if they can, with present knowledge, answer an item or perform the skill for test purposes; a "B" if they have partial knowledge/skill or know how to find the information required to answer the question within a short time (say, 20 minutes) or a "C" if one could not presently answer this question for test purposes.

You now have the basic idea. Next go to the Center's web site at http://www.isu.edu/ctl/facultydev/KnowS_files/KnowS.htm for examples, details, and a long list of benefits to be gained from doing so. This paper, published last February, represents our experience as of about two years ago. We now know more about how to use these well, and there is certainly much more to be learned. We have worked with ITRC the past year to allow a knowledge survey prepared in a word processor to be given to students via WebCT and the data returned to the professor as an Excel file to allow pre-post records of the kind shown in the above web site to be produced. We provide workshops on (1) constructing such surveys and (2) getting them up on WebCT. We are happy to come to any unit or department to present this. But you need not wait. Between the web site above and what you intend to do for your course, you can construct a "first edition" immediately.

To make the best use of this tool, you need to refer to it often through the course, align your lessons with your plan, and make certain students are using it too. For you, it will give a detailed record that can serve as a reality check for how fitting your plan is. If all goes well, better learning will be the outcome. Even if disaster occurs (you find the plan impractical and have to scrap it), take notes and the detailed record will reveal fully how you can design the course for success the next time.

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Engaging More of the Brain in More of the Students

Late last February, we held a major bash at the Red Lion as an all-day workshop, "Teaching with Awareness About How the Brain Learns" by Bob Leamnson, sponsored by ISU's Academic Affairs through the Center for Teaching and Learning. This year, we are pleased to offer a repeat event that extends last year's theme. Because the brain learns through building and stabilizing synaptic connections, acquiring tools and methods to engage students' brains in building and stabilizing is a terrific follow-up. A rich variety of approaches for so doing rests in the structures of cooperative learning.

The benefits of cooperative learning are known from over 600 research articles. We probably know more about cooperative learning than we do even about conventional lectures. Results from a meta-analysis of nearly two-hundred of these is available at http://www.co-operation.org/pages/cl-methods.html. Teachers who intersperse cooperative exercises in their lectures produce about 0.5 standard deviations increased learning over those who simply use conventional lectures only. The reason cooperative learning works is firmly grounded in last year's workshop theme—cooperative learning uses more of the brain to engage material than does listening and note-taking. Further, class exercises engage all of the students' brains in the class—not simply the brains of the few who actually answer a question. Some methods are so simple that you can use them in your next class. Try these.

Turn to Your Neighbor The next time you ask a question in class, don't wait for the single student to answer it. Instead, direct the class to "turn to your neighbor and explain your answer to your partner." Give them about a minute, then call on pairs to explain their reasoning and conclusion. You are going to experience an amazing difference in how the class engages material. Instead of the wall of silence that usually confronts a question, you are going to see an entire class engaged—sometimes so intensely that you'll need to almost beat pairs apart. When you finally call on a pair of students for an answer, you'll find that student pairs are less embarrassed about giving a wrong conclusion than may be true for an individual. Further, they will have already engaged in a discourse about the reasoning that led to a chosen conclusion, and thus will furnish you something substantial to work with to advance the learning of the entire class.

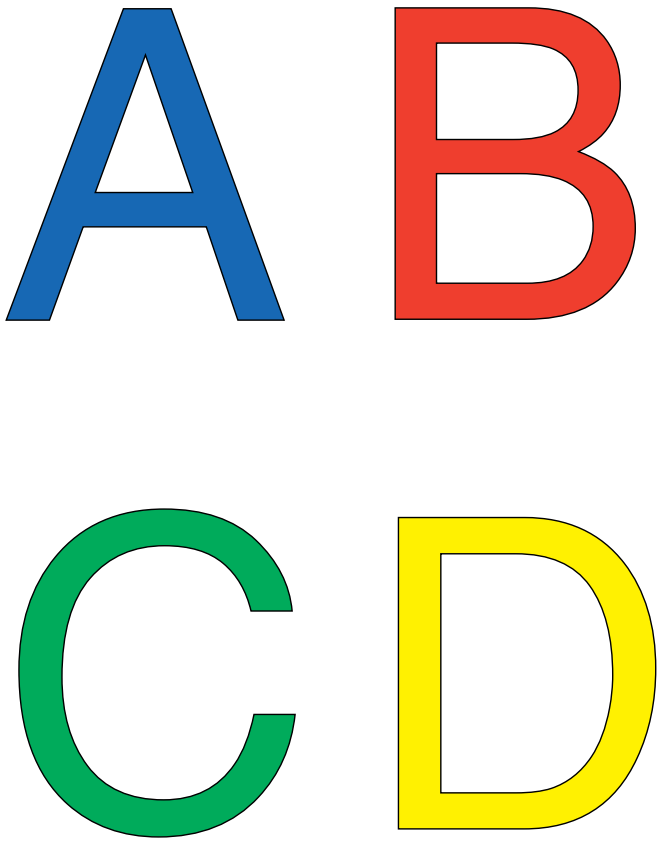
Think-Pair-Share is a simple step beyond "Turn to Your Neighbor." Think-Pair-Share may involve a simple or open-ended problem. After ten to twenty minutes of instruction, place a problem or query on an overhead that could test the understanding of what you have just covered. Give individuals a minute to write an answer or solution to the query, then turn to their neighbor to share results and to compare answers and reasoning. You might add a challenge: "Convince your neighbor that your solution is the better one!" Another minute or two allows the class to grapple with the material and test their comprehension. When you bring the class back to order, you can discover the dominant level of reasoning, and you'll find that their questions now have a higher concern with process.

Visible Quiz Visible Quiz is a superb tool that I learned from University of Nevada at Reno's Barbara Millis, author of Cooperative Learning for Higher Education Faculty. Visible Quiz is not in her book, Barbara credits its origins to University of Colorado at Colorado Spring's Constance Staley. This is my (Ed Nuhfer) color rendition of Visible Quiz. I find it one of the best ways to make PowerPoint® interactive.It takes only minutes to prepare materials for a class of 50 students.

I like to use 300-point font to create four letters in four colors on single sheets (see other side). Pass the sheets out to students, have them fold and tear part the sheet to produce four separate letters. Have the students keep these letters with them in their textbook for the entire semester.

To enact the visible quiz, place a multiple choice question or problem on the screen as a color PowerPoint® slide (see again other side). Ask students to respond by holding up the card with the colored letter that corresponds to the best answer facing the instructor.

There are dozens of such interactive exercises that we can use to engage students.



Cutting of the Grand Canyon

The pattern that best describes the event above is

A - Constant
B - Rhythmic (cyclic)
C - Fractal
D - Experimental

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Cooperative Learning: Solid, Versatile, and Important

Cooperative learning techniques intuitively fit disciplines such as social sciences, humanities, and professional programs that emphasize discussion, exchange of ideas, evaluation of open-ended problems, and communication. However, it is surprising just how many professors in the sciences, engineering, mathematics and technology have also applied and furthered cooperative learning. The latter disciplines are often areas with need for specific content coverage — and thus a concern for using class time in the most effective ways possible.

L. Springer, M.E. Stanne, and S.S. Donovan ("Effects of Small-Group Learning on Undergraduates in Science, Mathematics, Engineering and Technology: A Meta-Analysis," Review of Educational Research, 69, 21-51, 1999) used data obtained from 3500 students to evaluate benefits of cooperative learning in these "hard" disciplines. In terms of content learning, employment of cooperative techniques resulted in 0.51 standard deviation in average improvement in learning. Students who experienced such approaches moved from the 50th to the upper 70th percentile on standardized exams. Further, the improvements were greater in minorities who often don't perform as well in conventional lecture-based classrooms. The cooperative exercises supported and increased students' persistence (0.46 standard deviation improvement) and improved their attitudes (0.55 standard deviation improvement). It conclusively demonstrated that what students learn is influenced by how they learn, and that most learn best through active, collaborative, small-group work. What is most encouraging is that the study revealed that one did not have to use complicated structures to get the result; one could easily incorporate a few simple structures to break up lectures and permit students to grapple with the material presented. Beneficial results were consistent across all student levels and across all the disciplines investigated.

Dr. Richard Felder, Chemical Engineering, North Carolina State University, has made significant contributions to both learning style diagnoses and active learning. He notes: "You don't have to spend a great deal of time on such exercises; one or two lasting no more than five minutes in a 50-minute session can provide enough stimulation to keep the class with you for the entire period...actively involving students in learning instead of simply lecturing to them leads to improved attendance, deeper questioning, higher grades, and greater lasting interest in the subject. (See Felder's site at http://www.ncsu.edu/felder-public/RMF.html.)

Another excellent contributor is Ted Panitz, a chemical engineer and mathematician at Cape Cod Community College. (See his very useful web site at http://home.capecod.net/~tpanitz/.) Ted observes: "Engineers are expected to work in teams in industry and collaborate on projects, yet in college they are faced with a competitive learning environment where class rank and position on the grading curve are of primary concern." The need to develop teamwork skills for career applications hasn't diminished since "Workplace Basics: The Skills Employers Want" was printed in 1988 by the American Society for Training and Development and the U.S. Department of Labor. The majority of the seven skills develop better through cooperative learning strategies than through lectures. Particularly these are: (1) oral communication; (2) adaptability and creative thinking; (3) group effectiveness, interpersonal skills, negotiation and teamwork, and (4) organizational effectiveness and leadership.

Learn how to add cooperative methods to your teaching repertoire under the able instruction of **Dr. Barbara Millis on February 27. See back of this newsletter for details for this event and for the Sonia Kovalevsky Math Day on Feb. 28.**

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Benefitting from the DEADLY Time of the Year

The "deadliest time of the year" for a professor is now—the final two weeks of spring classes. This is when links that never appeared weak during the entire year will begin to break. We forged such links when we constructed our syllabi and course schedules, under more idyllic conditions such as Christmas break. Now, we may find ourselves overwhelmed.

This time of year comes with a flood of term papers, exams, & journals to be graded, final exams to prepare, and laboratories to clean. Many disciplines' professional societies (whose executive directors don't need to contend with any of the above) blissfully schedule national or regional meetings in early to mid-May at the peak of the deadly period. Faculty in these disciplines can then add papers and presentations for the critical spring conference to their nights and weekends. All of this results in getting 5 hours or less of sleep each night, which tends to remove some of the more charming parts of our personalities. Our colleagues are also likely to be tired and overly stressed, so now is a good time to strive to treat one another especially well!

Some trials on our patience come from dealing with students' procrastination. Students who cut a third of their classes may now appear in crisis-mode seeking an "incomplete" or an "extra credit project." A few may have awakened to a realization that they never understood the material covered in February, and only now do they demand help with it. This comes at a time when committee chairs and administrators also discover their own weak links and try to cram in "just one more meeting." It's a time of pressures when everyone discovers that the time just isn't available to do everything gracefully.

However, it is also the time when we can get great benefits by simply keeping a log of what now abrades us. This log allows us to set in place ways to prevent these things. While there is real temptation now to "just get through it alive without trying to be creative," we'll pay big-time if we succumb to that. Soon, we'll forget the horrors we experienced, and by autumn, we'll again set the pattern for the same events to occur. You might now even recall being in a similar predicament this time last year. Helping yourself and others to minimize bad situations is the theme of this Nutshell Note.

Your best friend now that can help you not to repeat deadly times is a blank sheet of paper. Tape it to the back of your door now; don't allow this paper to get onto your desk or into a file, where it will likely be churned out of sight during the mayhem of the next few days. Keep it accessible. As crises and irritations occur, record them on that sheet, and try to add a brief note as to how to correct them. When you get ready to plan your next courses and syllabi, sit down with that sheet of notes. An example from my first "door list" was "Swamped with grading late student work—change syllabus!" My next syllabus stated: "No late work is accepted or makeups provided unless you make prior arrangements to extend a deadline." Students now know the rules, and those who are sick or have work emergencies know to notify me, and they can be confident that they will be taken care of. The few students who did a disappearing act but now expect special rescue treatment at least learn why they must read syllabi. That statement in my syllabus now prevents others' personal choices from becoming my problem. I may not have stressed that point in my syllabus, had I not recorded the problem when it occurred.

If there is any disparity between planned coverage of material and the facts of realistic pacing, it is most likely to show up in these final weeks. This was solidly documented by the results of a knowledge survey run in one course, where student learning was excellent until it dropped like a stone in the last two weeks. This revealed the folly of trying to "cover the material" by pushing too fast through too much. If we stop briefly to recognize the obvious: that our cramming in teaching is no more conducive to students' learning than their cramming in study, then we can redesign our course to accommodate reasonable learning rather than mere "coverage."

Your list may reveal problems that you could not correct on your own. Unsuitable classrooms, malfunctioning equipment, or unrealistic expectations can contribute their damages to the "deadliest time" too. Written records that acknowledge problems can be the first critical steps toward actual solutions, and a sharing of the lists compiled on those sheets on the backs of doors may be of benefit at your next departmental meeting. It is likely to result in a much more relaxed May for both you and your students in 2005.

OVER --see announcement for BootCamp 2004

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Event Planning for Next Fall - Faculty Development Circles

Faculty development can take many forms. We have had high rates of participation on this campus in formal campus-wide endeavors such as the February workshop and summer "Boot Camps." Another way that can accommodate more schedules is a faculty development circle. These consist of a small group of from two to eight faculty who meet three or four times during the semester to acquire some competence in an area of concern. It is similar to the "teaching circle," but includes topics on broader areas of development that relate specifically to what works while serving on an Idaho State University campus. Next fall, we want to experiment with this approach by sponsoring a series of faculty-directed development circles. These will be scheduled to accommodate participants, but most likely at lunchtimes during the week. Sponsorship will include support for food and possibly resources such as books or videotapes.

One can join a faculty development circle to meet with other colleagues for discussions of mutual interest, to discover resources and people on campus with expertise that can make a difference and to collaborate on a one page report. An ideal final product would be a one-page summary that provides resources that we can publish on the web for benefit of all ISU faculty.

The first round of circle topics follows. The sign-up procedure is fast and easy. One should open up the survey at **http://www.isu.edu/ctl/surveys/facdevsurvey.html** and respond to the prompts there, which will allow you to pick your top three areas of interest, add areas and disclose an area of expertise that might be called upon by a topical group. The Center for Teaching and Learning will take care of organizing the circles based upon expressed interests.

Active learning: theory and methods
Assessment of student learning outcomes
Classroom assessment techniques
Collaborative/cooperative learning: theory and practice
Copyright and intellectual property issues
Course and syllabus design
Dealing with students' stereotypes, biases, and misperceptions
Developing students' oral communication
Effective lecturing
Enhancing students' critical thinking skills
Ethical issues in teaching
Evaluating teaching
Forming partnerships
Getting started in grant writing
Grading and evaluating students
Incivility in the classroom: dealing with difficult students
Issues in on-line teaching
Learning outcomes: Differences between High School and College
Learning styles and teaching styles
Multiculturalism in the classroom
Problem-based learning
Promoting higher level thinking
Role play as a pedagogical technique
Rubrics and their construction
Service learning
Storytelling as a pedagogical technique
Strengthening instructional skills/practices in a vocational setting
Surviving tenure review
Teaching and learning with technology
Teaching portfolios
Testing--creating good tests and quizzes
Time management
Using case studies in teaching
Writing across the curriculum
Writing for publication

THANKS FOR YOUR SPLENDID PARTICIPATION THIS YEAR! A GOOD SUMMER BREAK HAS BEEN WELL-EARNED BY US ALL!

OVER --see announcement for BootCamp 2004

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Value of Rubrics — Part 1

"Rubric" is an old word, but is a newcomer in the conversation about college teaching and learning. Even stalwart survival manuals, such as McKeachie's *Teaching Tips* and Davis' *Tools for Teaching*, say little about rubrics. The term isn't usually found in the indices of these and similar books. Emphasis on rubrics in higher education is a recent development, which came as assessment of student learning achieved recognized importance.

In brief, a rubric consists of **the disclosed criteria used for the evaluation of a graded response to an open-ended exercise or assignment.** The word derives from the Latin *rubrica* or red, and relates to red print used to direct or redirect readers' attention to text of special importance.

The most important quality of rubrics lies in providing scaffolds to higher level thinking. In adult education, rubrics direct students' attention toward an understanding of how to engage a particular open-ended challenge. Although open-ended assignments have no pat right-or-wrong answers, they do have reasonable and unreasonable solutions. Perception of what constitutes "reasonable" is seldom intuitive, and gaining the ability to arrive at reasonable solutions is usually neither easy nor comfortable. When initially confronted with an open-ended challenge, most students experience frustration and sometimes fear. Ironically these constitute predictable reactions because such assignments remove the accustomed clarity afforded by unique solutions. After years of educational conditioning, students' initial approach will always be to seek a "right answer." The inevitable failure of that approach confronts them with their own lack of understanding of what constitutes a high quality response to an open-ended question. When they try harder, students often emit a familiar primal scream: "What does the teacher WANT?!" This cry signals what may be the opportunity of a lifetime for the "teachable moment," or it can foreshadow a scarring moment in a student's intellectual development.

The most common mistake stems from the presumption that students who are "smart" will "figure it out on their own" and, worse, to convey in some way that those who do not "figure it out" are either slackers or dullards. Gaining the "Aha!" victory comes from leading students to understand that a process exists for using evidence in formulating a reasonable response. The hardest thing for many professors to realize at these moments is the amount of structure it takes to bring about an understanding of this process. The essential, indeed, required tool for providing this structure is the rubric. Rubrics help to mentor students toward higher level thinking by directing them to attend to the frameworks with which to distinguish reasonable from unreasonable solutions and weak from strong arguments.

Our first example is at the class lesson level with the assignment: "Explain the historical development of the 'theory' of plate tectonics." The assignment meets an ISU GOAL 5 learning outcome: "Pick a single theory from the science represented by this course and explain its historical development." The rubric consists of a deceptively simple three lines
.
(1) About 500 words maximum (>550 unacceptable -10 pts)
(2) Factual detail (70 pts)
(3) Conveys awareness of relationships (20 pts)

The classroom exercise that preceded the assignment consisted of an active learning exercise in which students learned the contributions of twenty individuals from 600 B.C. to 2000 A.D. This served as the basis for factual detail. Indeed, students were used to regurgitating facts as right answers, and the notes from the classroom exercise gave them factual material. However, the 500-word limit posed a dilemma: "How can one possibly get the contributions into this short a paper?" There is only one way to get the required information into this short of a paper; it is to perceive relationships and group ideas and characters together. Once students do this, "Aha! moments" occur across the class like popping corn: one recognizes the difference between a list of facts and understanding them through a framework of reasoning. The simple rubric forced a very high level thinking ability — perceiving relationships and prioritizing them. By the end of the term, almost every student not only met the goal outcome, but also met it at a respectably high level. In an introductory course, it is more important that students have one high level challenge and understand what constitutes a high-quality response than it is to merely pass through only content-learning hurdles or to do several high level challenges poorly.

The situation makes obvious what is perhaps the most important value of a rubric: it provides a stepping stone through which to help students move from thinking of becoming educated as the accumulation of facts to seeing education as the development of more sophisticated reasoning abilities.

(To be continued)

OVER --see announcement for October 29 "Teacher in the Movies!"

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Value of Rubrics — Part 2

The last Nutshell introduced the nature of rubrics and an example at the level of an individual classroom assignment. Rubrics are not required for any convergent problem with right-wrong kinds of answers, but they are particularly appropriate when teaching students how to use evidence as a basis for reason and decision making. Using evidence to deal well with open-ended problems is an ideal goal for a baccalaureate graduate. At their best, rubrics become a means to help students recognize when their own conclusions or arguments are strong, even when an authority figure may not agree with them. Rubrics are useful at scales beyond single classroom lessons. More examples follow.

Example at the level of disciplinary major. Consider the following open-ended challenge in a science course: Is indoor radon gas found at common levels in houses dangerous to homeowners? The rubric for the assignment follows.

(1) Clearly separate testable hypotheses from advocacy of proponents as a basis for evidence. (40 pts.)
(2) Classify evidence as derived from either the method of repeated experiments or the historical method. (20 pts.)
(3) Use the definition of science as a basis to evaluate this evidence and state an informed decision about the risks posed to you. (40 pts.)

The first thing that this rubric does is to slam the door on any appeal to authority. The student engaged in "right answer mode" will be prone to go to a web source and answer: "Yes, radon gas is dangerous to homeowners because the U. S. Environmental Protection Agency says that it is" and feel quite satisfied. To a layperson, it may sound like this challenge has a right-wrong answer, but once one gets past the advocacy into the primary literature, one finds not convergent resolution, but conflicting evidence. Although the content lesson is about radon, the content is merely a vehicle to provide understanding about how science tests hypotheses both from experiments and field evidence, what is needed to constitute a proof, and how one must evaluate current evidence, imperfect though it may be, to make the best possible decision for oneself. This is not just a constructed problem-based exercise. Rather, it carries a mega-cognitive lesson: one can distinguish reasonable from unreasonable by conscious use of central frameworks of reasoning that every academic discipline possesses. "Good science" is good for particular reasons: it adheres to a framework of reasoning based upon formulating testable hypotheses about physical phenomena. Likewise, however, "good art" or "good theatre" are not simply "good" because one likes them; they are judged "good" because criteria exist that an educated person can learn, and a framework of reasoning exists through which one can evaluate a piece of art or a theatre production against these criteria. If desired educational outcomes include any ability to reason at higher levels, students must engage the frameworks of reasoning within disciplines through exercises and assignments that help them grapple with problems by consciously using the frameworks as a way to assess others' arguments and one's own reasoning.

Example at the institutional level. The "Framework for Self Assessment" provided as a fold-out in *Self Assessment at Alverno College* (G. Loacker, editor, 2000) is an institutional rubric designed to mentor students to high level thinking as the signature trait of that institution's degree. The components of observing, interpreting/analyzing, judging and planning each have detailed criteria that disclose when a student has mastered each component at the beginning, intermediate and advanced levels. Those familiar with the well-established adult models of thinking (Nutshell Notes n10 n5 & NTLF v11 n1 pp. 5-8—All ISU folks have on-campus access to National Teaching and Learning Forum through **http://www.ntlf.com/restricted/**.) will recognize the deliberate development of high level thinking in accord with the models of Perry and others as the plan behind this rubric. It provides ways for lessons, courses and curricula to contribute at all scales to this global institutional outcome.

Example in Educational Practice. The article "An Ethical Framework for Practical Reasons" (NTLF V10 N5 pp. 7-9) conveys a rubric. Ethical decisions we make as teachers and administrators don't have right-wrong solutions, but they have reasonable and unreasonable ones. Consider what occurs when one must act in a difficult situation with a student or employee and asks, "What are the implications of autonomy in this problem; where is justice; where is nonmaleficence involved and where is beneficence?" In asking these questions, a teacher or administrator has touched on the key points of a rubric based upon the four established basic principles of ethics. Thus, a decision based upon such a sophisticated and durable framework will yield a conclusion far more substantial than one derived from relying only on one's recollected experiences and feelings.

Just as content learning outcomes inform a careful choice of pedagogy to aid that learning, a carefully crafted rubric derives from awareness of characteristics associated with the development of the appropriate level of thinking.

OVER --see announcement for October 29 "Teacher in the Movies!"

the Center for Teaching & Learning

NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

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Assessment — What's Coming Up Soon

Since the past two Nutshell Notes on rubrics, the accreditation review team from the Northwest Commission on Colleges and Universities came and went. Their "Full-Scale Evaluation Committee Report" revealed some areas with good assessments of student learning—largely in units that have a learning assessment plan as part of accreditation requirements of the professional sector correlative with their disciplines. They also recognized areas with ineffective or no assessment as serious problems. The report noted our own Center for Teaching and Learning is a place in which "development efforts relate strongly to student learning models and styles," and that "Faculty instructional support has the necessary grounding in student learning needs." They noted that parts of the university need to take better advantage of this support. Sooo... in the coming year, please do that!

They further recommended creation of an assessment coordinator's position. Fortunately, this has happened, and our own Dr. Steve Adkison from CeTL will direct that effort. He will provide the assistance you need to develop an assessment plan, and Dr. Ed Nuhfer (me!) will provide the faculty development needed to help units and individuals meet those aspirations. After presenting at AAHE Assessment Conferences alone the past few years, I am happy to finally have an ISU colleague with a like interest in assessment. We have an exciting year ahead to accomplish good things. The programs and newsletters this semester will focus on assessment, development and tools for assessment.

Institutions that have begun to understand the nature of "a culture of assessment of student learning" have, frankly, found it to make a university a more pleasant place in which to work. It encourages collegiality, encourages inquiry and research, provides a clearer understanding of the link between one's efforts and an institution's mission and helps one understand how to better meet students' needs. It further can get a campus out of the rut of evaluating faculty without looking seriously at the outcomes of work being done in their classrooms.

Assessment of learning, like faculty evaluation, requires multiple measures. Faculty new to assessment are sometimes surprised to learn that their tests and course grades, in themselves, are unable to capture student learning or knowledge. As students move to high-level thinking (see NN V VIII, n1 - n7 at http://www.isu.edu/ctl/nutshells/index.htm) it becomes harder and harder to capture learning with the kinds of learning that in-class tests can sample. In most cases, faculty give exams and quizzes without performing simple reliability checks. When one does such checks, one learns quickly why tests are not the rock-solid "measures of actual knowledge" often presumed. We have a number of assessment tools available in the Center for faculty use. These include knowledge surveys, student management teams, formative diagnostic surveys, and techniques described in this newsletter. Be sure to also consult the National Teaching and Learning Forum through any ISU computer at http://www.ntlf.com/.

Next, an early announcement on ISU's annual February faculty development bash! Over a hundred ISU folks benefitted each time from Bob Leamnson's and Barbara Millis' workshops. This year, we'll have Peggy Maki, one of the foremost experts on assessment of learning. The workshop will be held once again at the Red Lion on Friday, February 25, from 8:00 a.m. to 3:00 p.m. Those who register early will have the holiday break to digest Peggy's recent book, *Assessing for Learning*, which we'll send to your campus box when you register. To see more, grasp page firmly and rotate wrist.

HAPPY HOLIDAYS!

OVER --see announcement for February25 "*Assessing along the Continuum of Students' Learning*"

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NUTSHELL NOTES

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Assessment: How reliable are our tests? Part 1

Prior to the development of assessment methods in higher education, most of us presumed that our tests were measures of "actual knowledge" and that student learning could be measured perfectly by tests and quizzes alone. We still use tests and quizzes to derive grades in order to evaluate individual students, but it is important here to understand the difference between evaluation of individuals and assessment. Assessment looks not at individuals, but rather at units such as a class, a course, or a curriculum as a whole. Thus, the tools of assessment and the concepts of interpretation differ from those used in evaluation of individuals. Assessment encourages us to look at our tests in the context of our classes as a whole. When we do, we find some valuable insights. One is the concept of test reliability. Here, we can use statistical correlation as a check. Calculation of a linear correlation coefficient (r) reveals how "perfect" a relationship may be between two variables. In Figure 1, a perfect correlation is shown in "A," where r =1.0 reveals a plot of two variables in which all points fit perfectly along a line. The relationship in "B" shows absolutely no linearity between two variables. The coefficient calculated from these points is zero. We can use the correlation to see how reliable our tests are. We need two variables, so we could give all of our students two tests, and see how consistently the tests measure the same students' knowledge. If "perfect," the plot will look like that in "A." But because giving two tests is a lot of work, we can use a standard method called "split halves" to discover the degree of reliability our tests provide. This involves randomly splitting a single test into two tests, such as using odd numbered items as one test and even numbered as another. If "perfectly reliable," each half should give the same result per student and a plot like "A" will result. Another way is to look at our past semester's grade sheet and treat our entire course grading as a single test. Thus if we gave ten quizzes or four tests, we could split our quizzes/tests randomly and do the same check. "C" results from a split half analysis on ten quizzes. It's a good result, but far from perfect, and shows that tests are not perfectly reliable. In fact, no single measure of student learning is perfect, and that's why assessment requires multiple measures. In routine test design, one hopes for an r value greater than 0.6. However, if you've never used your own class data to make such a check, you don't yet know the reliability of your own testing. You can try this yourself for your own tests. The Excel package in your office computer can calculate r values. The reverse side of this newsletter explains how to do this. What's that plot in "D?" Well, it's not a test for evaluating individuals; instead it's a knowledge survey for assessing student learning in our First Year Seminar classes, and the results show great internal reliability of that tool. We'll cover more on tests and knowledge surveys in the next issue. In the meantime, whatever you do, **don't forget to sign up for the assessment workshop on February 25. See back of newsletter for details.**

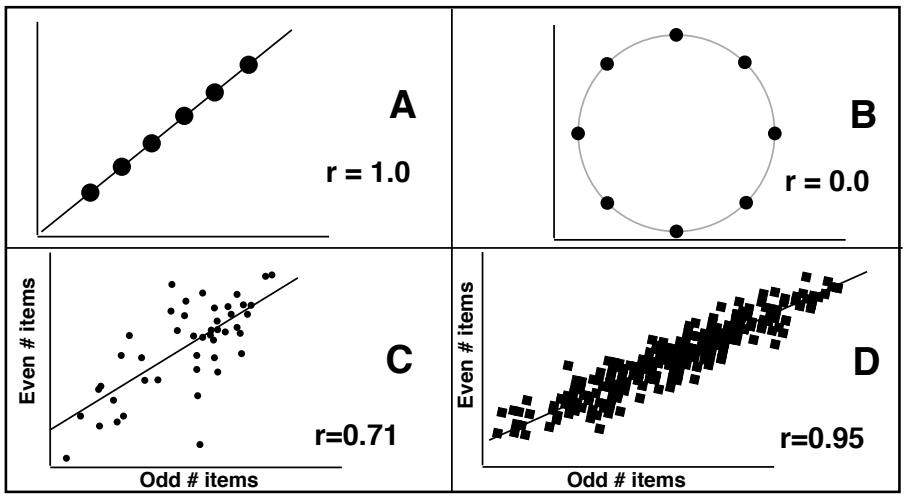

Figure 1. Scatter plots with associated correlation coefficients. "A" is a perfect correlation; r= 1.0 will be deduced from two identical sets of data. "B" is zero correlation. "C" is from actual test data in a Goal course that yields r=0.71. "D" is from actual knowledge survey data in ISU's First Year Seminar, and yields an r value of 0.96. More on correlations and their limits in our next issue.

OVER --see announcement for February25 "*Assessing along the Continuum of Students' Learning*"

All *Nutshell Notes* areposted at **http://www.isu.edu/ctl/nutshells/index.html** where web sites referred to are hot-linked.

Assessing along the Continuum of Students' Learning

Dr. Peggy Maki

February 25, Friday, Red Lion Inn by I-15 Pocatello Creek Road Exit

Breakfast & Lunch provided

Early Registrants Receive *Assessing for Learning: Building a Sustainable Commitment Across the Institution*, 2004, Stylus Press, 204 p.

To register, email to nuhfed@isu.edu and give your ISU mail box number

Beginning with research on learning, this workshop will present collaborative principles, practices, and strategies for assessing student learning at the institution- and department levels as students progress through their studies. The workshop will demonstrate collaborative steps involved in assessing student learning. See Peggy Maki's vita on the Center for Teaching and Learning web site. Click on "FACULTY" then "RESOURCES" then Nutshell Notes. Go to December, 2004 issue.

Calculatin' da correlation coefficient with da Excel® Spreadsheet

If you managed to get a doctorate without calculating a correlation coefficient and doing a least-squares line fit, then congratulate yourself; most of us were not so fortunate! This was an unpleasant, laborious task until computers; now it's a cinch. Suppose you have given a test to ten students. You have split the test into even items, odd items, and graded each. You now have two grades for each student from the same test. (Alternately, you could have given two tests, and you'd like to see how reliably two tests compare. If any student missed a test or took a makeup that differed from the first test you are analyzing, remove such students from the data base. You want clean data from only the test or tests you are examining. In any event, you now have a data pair for each student.) Type the data into two columns of Excel spreadsheet as shown in Figure 1. Each row represents a student's data. Click on Tools Menu. You may see "Data Analysis" as an option in the pull-down menu. If not, click on "Add-Ins" and select the "Analysis Tool Pack." Click "OK." "Data Analysis" will then appear as an option under Tools. Select "correlation" and click "OK." Because we have labels in the first row, check the box "Labels in first row." We want to correlate our data arranged in two columns, so click on "Columns." To keep life easy, select "New Worksheet ply" for outcomes. For the input range, click on the upper left cell (the one with "Odds" in it), type a colon (:), then click on the lower right cell. The input range is always upper left to lower right of the data set. If you want to check, say, reliability of five quizzes against one another, then you can have five columns in your data set. As soon as you click OK, your correlation coefficient(s) should appear, and will look like Figure 2. The data in Figure 1 yields the r-value (0.528) shown in Figure 2. Use the data here for a practice run with Excel®.

Odds	Evens
74	94
67	82
66	87
55	79
59	81
46	91
67	85
52	82
62	79
43	69

Figure 1. raw input data from test scores.

	Odds	Evens
Odds	1	
Evens	0.528	1

Figure 2. Output data calculated correlation coefficient (r = 0.528) by Excel® spreadsheet. Don't be surprised if your tests show lower internal correlations as measures of reliability than you presumed; our tests are usually not as stable tools as we think. If you seek to compare test data with another measure, remember that you can't expect any correlations higher than the tool you use with the lowest internal reliability.

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NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

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Assessment: Test Reliability and Its Implications—Part 2

More on Reliability. In our last issue, we looked at the concept of test reliability and correlation coefficients. Generally, the longer the test and the more students involved, the more meaningful is the coefficient. Why aren't tests perfectly reliable? Think of neural networks that contain particular knowledge (such as content of a course or a unit of a course) as a rough surface—like a large area of Earth's surface with its naturally rough topography. A test is like taking sample measurements across this surface. If two tests separately derive knowledge that are good representations of the surface, then they should both correlate very highly with one another. A problem, though, lies in the inherent roughness of the three-dimensional, interconnected, interfolded, branching neural networks produced through learning. This almost insures that tests are imperfect samples of the actual knowledge stored within these. In itself, this illustrates why legitimate assessment of learning requires multiple measures—not just test scores or grades. A test of a class samples not one brain "surface," but many, so one can recognize why writing a good test is a challenge. With revision, tests can be optimized, but we faculty don't have the luxury of tuning tests until fit for marketing. We must write our routine tests for one-time use, without tuning based on trial runs.

Individual test questions trigger responses from students to supply information or to use information to engage in a higher level thinking challenge, such as synthesis or evaluation. Different learners perceive knowledge differently, and their brains retrieve it a bit differently. If information is retrieved differently, an individual test question may trigger a response in some students and not in others, even though all may have the knowledge. In teaching, we know that to come at material from as many ways as possible accommodates the varied learning styles inherent in different students' neural wiring. Good test design must take student learning/recall diversity into account, just as does good instructional design. A "good" test will efficiently trigger responses from as many people as possible that have the knowledge. Our next Nutshell Note will deal with ways to write more reliable tests.

Implications. What instructional practices are most effective in producing learning? How well are student ratings of professors tied to students' learning? Educational research to provide answers to such questions involves comparisons of test scores with varied practices or student ratings. Faculty often see correlations such as r = 0.47 between student ratings and test performance (Cohen, 1981, Review of Educ. Res., v. 51, pp. 281 - 309), or r = 0.56 between test performance and the teachers' degree of preparing and organizing their courses (Feldman, 1998, Teaching and Learning in the College Classroom 2nd ed., pp. 391-414). Faculty who lack awareness of test reliability are prone to judge these as "low correlations" and erroneously presume that they result from fogginess of student ratings or the lack of real importance of course organization rather than part of the problem lying in the tests. When we get an r-value such as 0.47 between student ratings and test performance, part of the imprecision comes from imprecision in ratings and part of the imprecision comes from the tests themselves. In fact, measures of internal reliability of class tests may show that the tests do not correlate much better with themselves than they do with other good measures. Before we can use our tests to do any comparisons with other measures, we need to quantitatively deduce the reliability of our tests. When is a numerical relationship good enough to be useful? Cashin (1988, Kansas State Univ., Idea Paper n. 20) recognized: "*Correlations between.20 and.49 are practically useful. Correlations between.50 and.70 are very useful but they are rare when studying complex phenomenon.*" The nature of test reliability helps us to understand why correlations in educational research are not higher. Given the "wobble" associated with tests, Cashin's "very useful" values are as good as we can expect to obtain by pairing another measure with routine class exams.

Correlations work best when there is a range of scatter of both sets of data under comparison, and there are enough data points to make a correlation meaningful. Without such a range, some absurdities can result. Consider for instance a situation in which tests reveal that students learned little and student evaluations confirm as much. Data like this are likely to condense into such little scatter that aberrant points unduly influence the trend. Unrepresentative correlations can result despite high agreement in the actual situation. Consider the opposite situation in which nearly every student got an "A" and all students agree the learning that took place was high; unrepresentative correlation may again result for the same reason. In such cases, other statistical tools are needed.

OVER --see announcement for February25 "*Assessing along the Continuum of Students' Learning*"

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Writing Better Tests - Linking Assessment with Good Instruction

The March Nutshell comes a bit later in the month than I had hoped. Both spring break and producing a report on the "Ideal Classroom" characteristics of light, color and furniture, now hot-linked at the CeTL home page, took time. Go to that link. As you'll see, all who teach ISU students are invited to contribute to that resource.

As noted in the past Nutshell (v. 13, n. 2), individual test questions and challenges trigger responses from students to supply information or to use information. A test or test question ideally triggers a response that is representative of what a learner actually does know, but writing good questions that successfully trigger representative responses is not easy. Some simple statistical measures, like those shown in recent Nutshells, reveal that tests are not measures of "actual knowledge," they are samples of knowledge. Likewise, test scores and grades are simply numerical expressions of samplings of knowledge. We hope that assigned grades result from good samples, but even the best tests are never perfect representations in terms of either reliability or validity. Consider the following challenge: "Tell me all you know." Reflect for a moment on your own reaction to that question, before reading further.

The feeling that you have captures the affective experience that accompanies an encounter with a very bad test question. Does your response accurately represent what you do know? Surely, you possess an extraordinary amount of knowledge, but such a question is like putting water in a gas tank. It triggers the feeling of the brain's equivalent to an engine seizure.

Good tests, first and foremost, are products of good teaching. As an analogy in the last issue, we noted that tests are akin to representing complex topography with a sampling of survey points. The topographic area could literally be the Earth, or it could be the apex of a single hilltop. The larger the area relative to sampling size, the less likely the sample can give a good representation of what lies within the area. Thus, the first quality of good teaching related to tests is the need to focus. University of South Florida's Jim Eison is credited with an oft-cited admonition related to focus: "Teach less better."

On what should we focus? This brings us to the link between tests and assessment: we focus primarily on content that achieves course goals and produces the stated learning outcomes. The assessment movement adds quite a new dimension to defining "good teaching." It's not enough to equate good teaching with high student ratings or "customer satisfaction"; one has to demonstrate that students learned—they actually changed in positive ways as result of taking the course. Further, it's not even enough to show students are satisfied and they learned. One must demonstrate that what students learned meets truth in advertising: they need to master outcomes that justify the rationale behind offering the course. This is the reason that accreditation agencies do not accept grades as an assessment measure. Even if grades reflect learning, they don't reveal whether tests provided solid representations of the planned and stated course outcomes (written outcomes being a requisite before one can even begin an assessment process). On what do we focus most? If we have a priority plan based on stated outcomes, then we'll likely devote the most effort to cultivate success based on our higher priority outcomes. We won't simply test once on those priorities. Instead, we'll test highest priority outcomes repeatedly in different ways until we are assured that nearly every student in the class not bent on academic suicide through nonworking, nonattendance etc. has actually mastered that priority material. Thus, the second attribute of good testing is to test important outcomes in multiple ways. It's the counterpart to teaching content material using multiple modalities.

Knowledge surveys are a wonderful tool through which to enact a plan, because goals and outcomes can be stated, and content questions and challenges written that map onto those goals and outcomes. Further, they disclose a detailed plan to students at the start of a class, permitting superb organization for them and for us. For example, a global goal such as "Understands the methods through which science produces knowledge about the physical world" could easily have a dozen test items through a science course that relate to outcomes that reveal understanding of that goal. Mapping these together reveals the degree to which the outcome was met.

In terms of best ways to write and to grade tests, convenient resources exist. For short-answer multiple choice tests, essay tests and grading, consult the links at the CeTL web site through http://www.isu.edu/ctl/facultydev/resources1.html. You'll want the link to Kansas State University's IDEA Papers. Specifically, you'll want to download and print papers n.16-n.19.

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Year's End—Tests, Fear, and Debriefing

It's near semester's end when we become exhausted alongside our students—engaged to the point of sleep deprivation in our least favorite endeavors of testing and grading. At semester's end, all courses seem to turn simultaneously into all-consuming rituals of measurement. Students fear both low performance on exams and the humiliation that accompanies poor performance. Faculty fear for low performance too; we'll see student failure as reflecting poorly on our instruction. Finally, there is that gnawing suspicion that traditional short-answer tests may not be reliable indicators of students' knowledge or abilities. That suspicion is correct. Evaluation for grading purposes should come from much more than conventional short-answer tests. An attribute of good testing is to test important outcomes in multiple ways—a corollary to teaching content material using multiple modalities.

Good testing practice begins early, long before the first test or quiz. Success requires early attention to two details: understanding our students and understanding our responsibilities. Our students' levels of thinking should be foremost in our minds. We'll need to teach and test at the level of their needs. Our course likely comes with responsibilities to our department or our institution for particular learning outcomes. "Academic freedom" doesn't mean we can ignore those. By conveying solid representations of outcomes and expectations in our syllabus, and ideally by conveying these in both the syllabus and a knowledge survey, we begin to prepare our students for finals on day one. Once we have focus, we can plan reasonably to meet those outcomes, without undo cramming or crises at end of term.

"Fear," already noted here, is commonly associated with tests. Edwards Deming saw fear as detrimental to performance and listed "Drive out fear!" as one of his fourteen management principles. With tests, we should first remove fear of the unknown. It's obvious that we should test on what we teach, but the format of most tests and graded challenges can reduce fear if it's consistent with instruction. The pedagogical choices we use to present content will likely be a good basis from which to create the form of test we'll use for that content. For example, we can expedite very low-level thinking challenges such as learning vocabulary (the discourse of a discipline) with teacher-created crossword puzzles. Students can engage terms repeatedly in several take-home or on-line crosswords until they master the vocabulary. A quiz on vocabulary can then be delivered in a format consistent with teaching—as a crossword puzzle—simply because the format is consistent and familiar.

A second way to remove fear is to use authentic testing conditions for authentic challenges. Little professional work involves timed tests or projects in which we professionals are denied resources, time to reflect, to converse with colleagues, or intervals to set aside a project while ideas gel. We can deliver student tests that require thinking and use of evidence under the similar authentic work conditions we use. Take-home tests that challenge students to respond under authentic conditions can be very appropriate for some topics and purposes.

Tests actually reinforce emphases about what is important, and it's ideal if we can map test items back to stated goals and outcomes. Ideal content for learning and testing at the very end of a course might involve "clean up" such as polishing up some low level learning in review or engaging unifying topics that are "icing on the cake." Classes with knowledge surveys have a great advantage in planning, pacing, and in visualizing progress. Some believe comprehensive finals have attributes they really want. If so, one can better prepare students for comprehensive study by making quizzes cumulative, so that comprehensive study occurs throughout the course instead of at the end.

Learning should not end with a test grade. Post-test debriefings are valuable enough to use as a part of all tests. The debriefing contains three questions that spur student self-assessment. (1) In what way(s) did I perform well on this test? (2) In what ways did I perform less well? (3) What am I going to do about the problem area of greatest concern the next time I encounter a similar challenge? We can use debriefing ourselves for our own improvement. (1) "What did I teach well in this course?" (2) "What are the areas that are showing up now as troublesome?" and (3)"What am I going to do about this next term?" If we do our debriefing immediately in writing, perhaps tweak a syllabus now when problems are evident, it helps immensely to fine-tune our plans for next term.

See other side for important announcements.

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NUTSHELL NOTES

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Notes on the Meaning of Student Evaluations

The literature about student ratings is vast—the largest body of literature in higher education. Our April newsletter mentioned "Tests, Fear, and Debriefing" in regard to students' experiences with final exams. Faculty experience a counterpart at term's end in student evaluations. Sometimes fear and distaste for evaluation occur for good reason. The problem is not so much with the forms as with the way they are often misused in the evaluative process. I've received queries from a number of faculty and administrators here about student evaluations, so this Nutshell comes accompanied with an expanded resource on our Center's web site ("A Fractal Thinker Looks at Student Evaluations") to meet these requests. The theme of fractal thinking is one that I rarely stress in Nutshells, although I've explored this connection with other scholars through many articles in "National Teaching and Learning Forum." These are available to the ISU campus community throuh http://www.ntlf.com/restricted. The fractal model offers particular insights to the topic of evaluating faculty.

To begin, there are two very different kinds of student evaluations: "formative" (those that diagnose in ways that allow professors to improve their teaching) and "summative" (those used to evaluate professors for rank, salary and tenure purposes). Formative evaluations given during the ongoing course, usually about midterm, ask detailed questions that provide a profile of pedagogy and strategy being employed. Summative evaluations given at the end of a course are direct measures of student satisfaction. "Satisfaction" is the sum of complex factors that include learning, teaching traits, and affective personal reactions.

Research reveals a **general** connection between cognitive gains of students and ratings . Cohen (1981) and Feldman (1989) established correlations of r = about 0.5 between student learning and student ratings. These provide strong evidence that student evaluations reflect cognitive gains and that higher ratings of teachers **generally** reflect better student learning.

Research also reveals a strong link between affective reactions of students and the ratings they provide. Ambady's and Rosenthal's (1993) "thin slice" studies determined that students arrived at ratings for teachers after watching 30 seconds of silent content-free video that were highly consistent (r = 0.76) with end-of-semester ratings. Further, viewing of several 3-second video segments yielded only somewhat lower correlations (r= 0.68), Content-free video clips are not reasonably associated with cognitive growth, but an explanation that affective reactions form neural networks quickly, stabilize early and persist to the end of the course seems reasonable.

Formative and summative evaluations are related. Formative evaluations profile the instructional practices at work in a class, and employment of better practices does help to increase student satisfaction. If a professor has only one hour in her/his life to improve instruction, running a formative evaluation and getting a consultation is the most productive way to spend that hour. To obtain your own hour of benefit, arrange this with Edward Nuhfer by using contact information in the masthead of this newsletter.

Knowledge surveys (Nuhfer and Knipp, 2003) are also a type of student evaluation that address a gap between summative evaluations and class tests and examinations. They derive their information from a detailed look at the content provided in a course. All knowledge surveys examined to date produce extraordinarily high measures of reliability. As in assessment of student learning, a good evaluation of teaching requires meaningful use of multiple sources of information. Summative evaluations in themselves are woefully inadequate, and a combination of summative, formative and knowledge survey data provides for more comprehensive student input.

For much more detail and access to references cited here, consult the web links at the Center's Home Page (http://www.isu.edu/ctl/) by clicking on "Faculty" then "Resources."

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Harnessing the Affective Domain

October's issue arriving in late November results because I'm behind. *Mea culpa*! The November and December issues will follow quickly. I've never had a semester when I've been so incessantly in transit. Although rewarding, this term's "scholarly activity" in both geology and in faculty development should last me a few years. Since I returned Wednesday at 1:00 a.m., I am overjoyed NOT to have to catch an airplane or be anywhere outside of Pocatello!

This issue is longer and spills on to the back page. Such is a once-a-decade event in Nutshell Notes! With ISU's unusual disruptions through leadership changes this term, it is fair to admit that we have had more than the usual semesters' stress. Thus, it's a good time for a "Nutshell" to address affective influence on our work. For this, I drew upon two articles published in National Teaching and Learning Forum (v. 14, n. 1, pp. 9-11 and v. 14, n. 5, pp. 7-11). ISU folks can access both from an on-campus computer at http://www.ntlf.com/. All references cited are available there. As academics, we're comfortable with cognitive growth and purposeful, rational acquisition of knowledge. We are less experienced in dealing outside the cognitive realm. "Bloom's Taxonomy," described in *Taxonomy of Educational Objectives, Book 1: Cognitive Domain* —see Table 1) holds obvious appeal to us. Since publication in 1956, it has become one of the most cited and influential of all educational works. Fewer professors are aware of a second volume, *Taxonomy of Educational Objectives: Handbook II -Affective Domain* also produced by Bloom in conjunction with colleagues that same year. The latter is now known as "Krathwohl's Taxonomy" (Table 2, on back). In comparison to Book I, the second book is so rarely cited that application of the affective domain appears to suffer arrested development.

Despite some claims that we should separate the cognitive from the affective, our brains' complex neural networks communicate so effectively with each other that there is no cognitive learning or function unaccompanied by some aspect of the affective/emotional domain. We may speak of "objective tests" but terms like "test anxiety" arise for reasons. A student becomes a major in our discipline or signs up for our class often because of affective influence rather than through a purely cognitive decision. If our neural networks carry harmful affective qualities of low self-confidence, tension, fear, impatience, or wishing one was elsewhere, this will taint our performance, even though our cognitive components such as content competency and pedagogical practices are quite strong. What we feel is communicated nonverbally, and that feeling will be quickly transmitted to classroom participants.

Level	Description
1. Recall	Involves information expressed through recall & recognition: Example levels of challenge include "Who...?" or "What...?"
2. Comprehension	Involves understanding and expressing relationships derived from information through visual, oral or kinesthetic means. : Example levels of challenge include " Explain." " Summarize." " Predict." " Interpret." " Give an example." " Paraphrase...."
3. Application	Involves problem solving that requires comprehension of the issues and the selection and use of appropriate skills. Example levels of challenge include " Calculate." "Solve." " Apply." " Demonstrate." " Given ___, use this information to…."
4. Analytical	Involves accurately perceiving the nature and components of ideas and information and articulating these perceptions. Example levels of challenge include " Distinguish." " Compare." " Contrast" " How does ___ relate to___?" " Why does ___?"
5. Synthesis	Involves creative use of information and imagination to produce an original idea or product. Example levels of challenge include " Design." " Construct." " Develop." " Formulate." " Write a poem." " Write a short story."
6. Evaluation	Involves a decision to make a choice or a judgment based on evidence and ability to assign a relative value to different choices as to being most reasonable or appropriate. Example levels of challenge include " Evaluate." " Appraise." " Justify which is better." " Evaluate ___ argument, based on established facts." "What if..."

Table 1. Bloom's taxonomy of the cognitive domain (derived from Bloom, 1956.) For a particularly exquisite rendition of this taxonomy, see http://www.stedwards.edu/cte/resources/bwheel.htm)

Research on thinking models, whose upper stages contain the attributes of what we loosely call "critical thinking," confirms affective influences on cognitive development. Perry's (1999) choice of title for his volume on stages of thinking: *Forms of Ethical and Intellectual Development…* indicates recognition of both affective and cognitive components. Use of "committed" to describe the higher levels of Krathwohl's taxonomy and "commitment" as the word chosen by Perry (1999) to describe his upper stages reveals overlap. No less do the choices of "value" by Krathwohl corresponding to "value" used to describe the upper levels of the Reflective Judgment model (King and Kitchener, 1994).

Level	Description
1. Receiving	Awareness of the environment, as in listening and being aware of information being received
2. Responding	Actively participating, as in engaging in questioning, or in purposely focused attention
3. Valuing	Possessing personal interest or commitment to action Reconsideration of old ideas in light of new information to produce a new outlook or attitude.
4. Organization	Assimilating a new outlook/value as an aspect of one's internalized values by forming some identification with that value and commitments that involve it.
5. Characterization by Value	Acting consistently with acquired values and perhaps becoming expert in their further development and use.

Table 2. Taxonomy of the Affective Domain. This is often called Krathwohl's Taxonomy (derived from Krathwohl, Bloom, and Masia, 1956. See also the web sites at http://classweb.gmu.edu/ndabbagh/Resources/IDKB/krathstax.htm and http://chiron.valdosta.edu/whuitt/edpsyint.html).

The presentations in Tables 1 and 2 reveal Krathwohl's affective taxonomy presents a parallel model of an affective domain's rational development along with conscious development of the cognitive domain. Nothing in Krathwohl's taxonomy attributes educational importance to an affective domain unbridled by reason, but the latter exists and influences our efforts. Edward De Bono's "Six Thinking Hats" model (De Bono, 1985) elegantly captures this irrational affective domain. De Bono uses six colors of hats (white, black, yellow, red, green and blue) to focus upon different kinds of thinking. In exercises, six participants each wear a hat of a particular color while confronting an open-ended problem. Each must focus thought based only upon the thinking role defined by the hat. Roles include the purely cognitive role of stating the facts (white hat), and expressing negative/positive emotion that must be justified by good use of evidence (black hat/ yellow hat). The red hat role manifests raw emotion that need not be justified by evidence or even be connected with reason. The blue hat plays the controlling role of keeping these hats on task, with the idea of harnessing the contributions of all to yield insights of creativity (green hat). In the role-play, all players assume all roles by passing hats clockwise until each individual has worn all six hats. The total thinking encompassed by all the six hats is equivalent to the high levels of thinking in established models such as Perry's. De Bono's "red hat thinking" recognizes an affective domain expressing itself intuitively and instantly through gut feeling, without benefit of either the cognitive domain's experiential learning or consideration of evidence. De Bono respects the surprising power of the affective domain to influence what one might presume should be cognitive evaluative decisions. To begin to use the affective domain in teaching, we also need to recognize it as legitimate, powerful, and useful.

Both students' and teachers' affective domains can create detrimental red-hat kinds of messages, especially when stress exists in the workplace. If placed into words, examples may be: "I have a really bad feeling about this," "I'd rather be doing something else," "I'm feeling fearful, blue, nervous, *etc*." Telling ourselves that "the students don't want to learn," that "they are not college material," or that "I simply was not born a good teacher" is self-destructive beyond most instructors' imaginations. An affective component that repeatedly paints self, students, or one's institution black is surely a detriment. Unless we respect the power of negative affective aspects to harm our own neural networks, we may find it harder and harder each day to get into class and enjoy being there with students. On the other hand, purposeful development of enthusiasm, love of subject and/or students, and positive commitment will eventually yield massive neural networks that radiate these qualities in the classroom.

Ways to deal with negative tendencies of the irrational affective domain are probably through some actions that might not seem rational from the cognitive perspective. Seeing humor of difficult situations is one good antidote. Gaining renewal by retreating to a positive environment is sometimes necessary. Be sensitive to the brief moments in your classroom when you sense/feel particular joy or satisfaction at being there. Learn to hang on to these moments. There is strength to be gained. When you can call on such feelings, your students will sense that you do want to be with them, even when difficult moments occur.

Breaks are beneficial when you see a class starting to de-focus. De-focus won't likely happen if you break up lecture with varied active learning exercises. If you've failed to do this, getting students up for a fifteen second stretch will surely improve an attitude that will otherwise go further into decay if you just power through the period without really seeing the students.

I am no advocate for playing music during class. As an irreverent skeptic who tried both "Superlearning" and "Mozart Effect," I view such approaches as "academic snake oil." But now, the true confession— there is always music playing in my classroom *before* the start of class! It's hard to feel nervous or scared about a science class when the room one enters is filled with beautiful music. As students enter the class, always there is an overhead posted on the screen with the class plan for the day with any assignments, and often a crossword puzzle on their desks emphasizing the terms in the readings or last class session that students can work on as the classroom fills. This conveys we are working to learn, but the message coming with music is a deliberate action to capture both affective and cognitive aspects at the outset of class. I also do this for me. Whenever possible, I like to get into the classroom at least twenty minutes or more before class, enjoy the music as I arrange the room while my mind leaves the outside world behind and enters the same enjoyable space prepared for my students. It certainly FEELS better than rushing into class at last minute and keeps me from bringing any harried feeling before the affective perceptions of students. **The affective provides useful energy. Harness it!**

the Center for Teaching & Learning

NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

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Helping our Students to Achieve Better Thinking

The first Nutshell I wrote for ISU in 2002 (NN vX n5 - http://www.isu.edu/ctl/nutshells/nutshell10-5.html), presented varied models of adult thinking. The foundational model is that of William Perry, who identified nine stages of adult thinkers. You can learn the characteristics of each stage quickly at http://www.isu.edu/ctl/nutshells/index.html, in the Nutshells written in 2000. Because Perry did his pioneering work with students at Harvard, who were primarily white males, others suspected that his model would not be representative of other students. However, the table in that first ISU Nutshell revealed that subsequent workers, even those who hoped to create their own new descriptive framework, inevitably produced a model that revealed developmental stages in the same sequence and of similar character to that deduced by Perry. The most thorough study that included a variety of students from every conceivable kind of institution is described in the book, *Developing Reflective Judgment* by King and Kitchener (1994). It represents decades of work, and remains the best resource. No subsequent study has had comparable depth. Of importance here is that their first six levels, those that apply most to undergraduate adult learners, are congruent with the first six levels of Perry.

Many faculty are familiar with Bloom's 1956 cognitive taxonomy. A table in the last Nutshell summarized this taxonomy. It has a similar sequence to that of the Perry model, but it is usually employed as a teacher-centered tool, through which the teacher plans a lesson or formulates a question characteristic of a particular Bloom level. The problem is that one can pose high-level challenges as a teacher but get low-level responses from a learner. Students can do synthesis and evaluation well, in which case they think in Perry stages of 5 and 6, or they can do it poorly and operate between Perry stages 2 and 4. In 2000, David Krathwohl (the researcher noted as the primary developer of the taxonomy of the affective domain in the last NN issue), completed a book with coworkers describing a revised Bloom taxonomy. One access to the revised taxonomy is the link, http://www.kurwongbss.qld.edu.au/thinking/Bloom/blooms.htm. An important refinement is the addition of "creativity" as the highest level.

The attribute of all of the stages, perhaps with the exception of "creativity" in the revised Bloom scheme, is that they are hierarchical; one must pass through lower levels before one can obtain higher-level proficiency. It is not at all clear where/if "creativity" fits in a hierarchy of reasoning. This is perhaps one reason that the later Bloom scheme has not quickly replaced the original version. Certainly, we need more work on the nature of creativity to better understand it and where/if it fits into a scheme of developmental reasoning.

Dee Fink (2003, *Creating Significant Learning Experiences: An Integrated Approach to Designing College Courses*) takes a unique approach. His scheme, accessible through the Idea Papers at http://www.idea.ksu.edu/resources/Papers.html, paper number 42), unlike those of Bloom, Perry, etc., is not hierarchical. Although it doesn't map well onto the research discussed above, it is certainly useful for course design and is a legitimate view of students' thinking. A problem with our focusing only on course design is that single courses seem unable to advance high-level thinking a great deal. For physiological reasons, it takes a longer time and several courses (a curriculum) designed to produce such thinking as an outcome.

Two individuals, Cindy Lynch and Susan Wolcott, extended the Reflective Judgment model and presented their version in a form more easily taught to faculty, as "Steps to Better Thinking." A summary exists at *http://www.idea.ksu.edu/resources/Papers.html* as paper number 37. Cindy Lynch died in 2002 in a tragic automobile accident, but Susan Wolcott continues to provide training workshops, which garner extraordinarily high ratings of satisfaction from attendants.

What's in this for us? First, if there is a best outcome that justifies the effort of obtaining a college degree, it is empowerment of a graduate to think at higher levels. Unfortunately, institutions vary considerably in their success in providing such empowerment. Most high school graduates enter college at a Perry level 3.7, and graduate at a level 4; they advance in four years only about 1/3 of a unit on a nine-point scale. However, curricula designed to promote better thinking advance students at several times that average. There are two keys to succeeding with such curricula. One is to clearly understand the level at which most of our students are now operating. The second is to design experiences that will first meet them where they are, then challenge them at just beyond that level.

Now, for the great news, see the back of this page!

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Nutrition for Neurons—Eating for Thinking (part 1)

While the brain is a wondrous, self-repairing part of our bodies, it is nevertheless like any complex machine. When the owner neglects maintenance, complex machines sputter, malfunction, and break down. One way to maintain longevity of mental performance is to use the brain. Research presented at the American Psychological Association (http://www.eurekalert.org/pub_releases/2003-08/wuis-fmf080703.php) revealed that among adults studied (average age 75 years), one out of four had managed to avoid memory decline. The adults who maintained high frontal lobe function (the part of the brain involved in high level thinking--**see workshop notice on back**) had memory skills "every bit as sharp as a group of college students in their early 20s." Some were retired academics. High level thinking seems to improve chances of both a long, productive career and a much-extended quality of later life—not bad perks at all!

Development of high level thinking promotes development of synaptic connections. The brain requires building materials for new circuitry, and particular nutrients to maintain the power supply that drives the circuits. It's best if good maintenance begins early in life. "Nutrition and Learning Resource List for Professionals" (http://www.nal.usda.gov/fnic/service/learnpub.html) provides many studies that document the importance of diet to learning in children, but nutritional maintenance is equally important to adult thinkers. So, what foods seem particularly important?

First, water! The brain is more than 80% water. In 1995, neurophysiologist C. Hannaford noted that mild dehydration produces a common condition of poor learning performance. Dehydration is a special problem in areas typified by dry air and high altitude, such as Pocatello, Idaho. Learning specialists advocate several glasses of water daily to optimize learning . Although some professors ban eating and drinking in class, one should consider the benefits of bottled water.

Protein is the foremost nutrient required for brain maintenance and repair. Fish is the commonly known "brain food" and with good reason. Fish is rich in taurine, an important amino acid for the brain. Although "fish oil" is better known for its role in enhanced circulatory health, research also ties lack of omega-3 oils to mental problems, including low intelligence, learning disabilities, depression and degenerative neurological diseases. Fish oil seems to enhance brain speed, memory and learning. Omega-3 fat also imparts a sense of well being, and helps thwart some types of depression. Salmon, mackerel, sardines, and herring are rich sources for omega-3 oils. Not all "omega oil" is helpful. A Dutch study reported that older men with diets heavy in omega-6-type fat found in margarine, salad dressings, corn oil and processed foods were 75% more likely to be intellectually impaired compared to men who ate the least amount of such fat.

Good amino acid sources for the brain include fish, organ meats (taurine), pork, cottage cheese, eggs, wheat germ, fowl (tryptophan) and beef (carnitine). Italian researchers found that diets with adequate carnitine promoted better memory, attention focus, and verbal skills. Tryptophan is an important brain amino acid that is converted into useful brain chemicals such as melatonin. Dietary deficiency of tryptophan reduces such chemicals. Because age reduces the body's ability to produce melatonin, tryptophan's role becomes increasingly important (see http://www.worldhealth.net/p/133,1124.html). Creatine found in meats is known to benefit working memory and intelligence. However, unless you are a strict vegetarian, it's unlikely you'll have a creatine deficiency.

Breakfast has special importance for scholars. The brain uses glucose as fuel, and glucose levels are lowest after a night's sleep. Students who skip breakfast to attend a morning class will not be at their potential for learning or participation. Low-income students or those inclined not to think about long-term effects may breakfast habitually on breads or processed cereal. Such breakfasts, largely devoid of important nutrients tyrosine & choline, don't provide nearly the boost for thinking and learning that good protein sources, such as eggs and meat provide.

(Continued next issue)

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Nutrition for Neurons—Eating for Thinking (part 2)

(Continued from v13 n8)

Sweeten your Morning.

Glucose is a major nutrient used by the brain, and glucose is most depleted after awakening from a night's sleep. There's good reason to include fruit or a glass of fruit juice in the morning, along with proteins mentioned in the last Nutshell. The glucose in it can help stoke the firing of synapses. Coffee, despite its bad reputation, and black tea are the subject of a number of studies that confirm caffeine's ability to increase alertness, learning ability, memory and reasoning. Particularly surprising is coffee's apparent role in helping to offset the effects of sugar by decreasing susceptibility to diabetes (see http://coffeescience.org/). Coffee is probably the least controversial mind-enhancing substance of all. Many academics are fans of its qualities.

Brain Nutrients

Beneficial nutrients in foods and supplements tend to fall into three categories: (1) those that nurture the circulatory system in general, (2) those that prevent free radical damage in general, and (3) those that promote better specific brain function by providing or assisting brain neurotransmitters. Examples of the first category include the vasodilator, niacin, and the coenzyme, CoQ10. Examples of the second are a variety of antioxidants including vitamins A, E, and C. An example of the third is choline and pyridoxine (B-6).

Age-related breakdown of the brain involves damage by free radicals, so free radical scavengers such as vitamins C, E, A, and selenium are important to maintenance of a healthy brain. Vitamins, C, E, and A are easy to procure through a balanced diet. Studies at University of Southampton in England discovered that cognitive function was poorest among those studied with the lowest vitamin C. Those study participants who did not perform well on the administered mental exam also had an increased risk of death from stroke resulting from vascular impairment. The researchers concluded "Vitamin C status may be a determinant of cognitive function in elderly people." Selenium intake is related to mood and morale. Those tested on a diet high in selenium reported feeling more clearheaded, elated, confident and energetic. Selenium intake varies markedly with individuals. Brazil nuts are a particularly rich source of it.

Memory, alertness, visual ability, attention, and focus needed to undertake organizational tasks are also affected by the B vitamins, especially B-6, B-12, thiamine and inositol, choline, the major elements magnesium, sodium, potassium, iron and trace elements zinc, selenium, and boron. Vegetables and especially nuts (peanuts in the case of boron) are good food sources for many antioxidants and trace nutrients (see also "Boosting Working Memory," Science v. 290 Dec. 22, 2000, pp. 2275-2276). The National Institutes of Health ascribe particular benefits to obtaining adequate folic acid (http://www.nih.gov/news/pr/mar2002/nia-01.htm). Lack of dietary folate promotes dementia and impaired short-term memory. Harvard researchers found up to 38% of adults diagnosed with depression have low blood levels of folic acid and respond less well to antidepressant drugs. Oxford University studies found that low blood levels of folic acid triple risk of Alzheimer's disease. Good folic acid sources include green leafy vegetables, citrus fruits and juices, whole wheat bread and dry beans. Pyridoxine (B-6) is also important. In the brain, it is involved with production of an important chemical, serotonin. Low levels of serotonin also lead to irritability and even depression.

USDA workers at Tufts University found elevated levels of the chemical homocysteine associated with dementia, but B-6, B-12 and folate help metabolize that chemical. They concluded in American Journal of Clinical Nutrition: "Low B vitamin and high homocysteine concentrations predict cognitive decline." (See http://www.vitacost.com/newsletter/newsletter.cfm?nl=241)

Got Supplements?

Soil depletion of micronutrients is a concern for food quality, so as depletion occurs, there may be increased need for trace element supplements. Because many students (and professors!) often are too busy to attend well to diet, supplements taken with informed awareness and in moderation consisting of a daily multivitamin compounded with trace nutrients can be worthwhile. Studies in the late 1980s showed that groups who received a multivitamin supplement outperformed control groups in reaction time, visual acuity and in measures of intelligence.

No research reveals that megadoses of anything enhance cognitive function, and megadoses of some supplements (especially E, A, selenium) are harmful. The free-radical theory of aging spawned an unfortunate response through overdosing. Some free radicals are essential and used by the body. Too much of a single powerful antioxi

Continued on other side with important announcements

dant (such as vitamin E) can reduce these below optimal and interfere with needed cellular functions. There are several varieties of vitamin E. The common E vitamin supplement is d-alpha tocopherol, whereas the E vitamin seemingly important to cognitive function is gamma E or gamma tocopherol found in nuts and vegetable oils and in only a few supplements. Choline supplements may be helpful to some. Choline is converted into acetylcholine in the body, a chemical that is an important neurotransmitter. However, choline taken as a supplement does not easily pass into the brain to be converted, so effects may vary with individual. The compound, phosphatidylserine (PS), found in every cell in the body but particularly concentrated in the brain, naturally declines with age. PS supplements have been proposed to combat loss of mental acuity. PS is in numerous foods, such as rice and green leafy vegetables, but in small amounts. There is currently no solid evidence to indicate that PS supplements in larger amounts boost mental function of healthy individuals, but the reader will find the compound as well as others of unproven value marketed for this purpose (see http://www.wholehealthmd.com/refshelf/substances_view/1,1525,813,00.html).

A few firms compound specific supplements to maintain good brain function. Before trying any of these, study the label and research every ingredient in it on the Web to learn the effects of each and to insure the dosages you obtain, in conjunction with other supplements you may be taking, don't add up to an overdose. Some otherwise beneficial nutrients can interfere with the effects of particular medications, so those on any prescription medication should check with a qualified professional to see if an ingredient may prove detrimental. *The Memory Doctor* by D. J. Mason and S. X. Smith (2005, Oakland, CA, New Harbinger Pub.) provides two good chapters about supplements and effects of common prescription medications.

Helpful Herbs.

Even "Skeptical Inquirer" (2001, v. 25, n. 1, pp. 43-49), admits that a few herbs really can improve cognition, although researchers also caution against concurrent use of some herbs with certain prescription medications. Ginkgo has been the most thoroughly researched as a cognitive activator. It seems to act as a mild vasodilator and delay the decreased cognitive function otherwise imparted by normal aging. It won't boost IQ or do some of the things that charlatans may claim. It can also interfere with some anticoagulant prescriptions. Ginseng (Panax ginseng) is shown by several studies to facilitate learning and memory. Huperzine, a herbal supplement derived from Chinese club moss, enhances memory, focus and concentration, in those with progressed dementia. Others who take it probably won't notice any effects. All three herbs seem to work by enhancing electrical activities associated with memory formation and by increasing the production of or enhancing the activity of acetylcholine, a neurotransmitter utilized in memory and other cognitive activities.

Vice and Wisdom

Evidence confirms that tobacco smoke and excessive alcohol use take a severe toll on our brains. Researchers at the Cincinnati Children's Hospital Medical Center studied nearly 4,400 children exposed to secondhand smoke. The study tested blood levels of cotinine, a substance produced as the body breaks down nicotine after tobacco smoke exposure. They evaluated cotinine level against math & reading scores and found a negative correlation between cotinine and test scores. Excessive alcohol use causes deficiency of particular B vitamins important to mental function and mood, such as folate from folic acid and thiamine. Alcohol inhibits absorption of these vitamins, and alcoholics tend to neglect diet in general. Over time, folate deficiency produces serious consequences in decreased immunity. It's wise to follow the night party with a morning B-supplement.

Spice It Up!

Three spices seem particularly helpful. The benefits of two of these are recently confirmed. Garlic is the traditional herb with a folk reputation for its ability to improve mental function. It is a rich source of selenium and other components known to be beneficial to cognitive function, but no study has shown a powerful link to its ability to enhance cognitive function. Not so with the other two herbs. Clinical trials with healthy, young adults revealed those who had taken sage oil capsules performed significantly better in a word recall test. Compounds in sage apparently inhibit breakdown of acetylcholine. The most exciting discovery involves curcumin, a component of turmeric that imparts the yellow color to curry spice. Populations that use curry as a common spice have unusually low levels of dementia. It may work by preventing the protein plaque, a known marker of Alzheimer's disease, which apparently causes blockages in the brain. Curcumin may be important to the prevention of that disease.

Additional resources

References and hot links appear at the end on the web version of this issue at http://www.isu.edu/ctl/nutshells/nutshell14-1.html. **This is a health professions campus, and help is appreciated from experts in pharmacy, nutrition, or others with useful information. Please e-mail submissions to nuhfed@isu.edu . I'll append resources, corrections etc. to keep this particular web issue current and the information as good as possible for the entire campus.**

SORRY --CLOSED!---ISU's annual February faculty development event!
Building and Assessing Students' Critical Thinking Skills
Dr. Susan Wolcott
February 3, 2006, with 118 registrants

the Center for Teaching & Learning

NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

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Perceiving Teaching's Temporal Temperaments (2) - Magnitude, Age, Order

This *Nutshell* continues from V14N2 with the theme of the concepts of time and change-through-time as applied to teaching and learning at college level.

Magnitude

The fractal pattern of rainfalls and floods we saw in the last *Nutshell* carries with it the quality of events of varied magnitudes occurring as punctuated events. Sylwester (2002) employed an interesting term: "maturation," to describe the punctuated event of an adolescent's transition to reflective adult thinking. "Maturation" is also the term used in geology to describe the punctuated conversion of marine organic matter into petroleum. Early investigators in the 1950s, still wearing the blinders imposed by Lyell's gradualism, expected a gradual transition from organic matter into oil. When continuous samples taken downwards from recent marine deposits into producing oil strata in the Gulf of Mexico failed to show gradual conversion, the obvious interpretation, that petroleum was generated through a punctuated event, simply just wasn't made. Decades later, "maturation" correctly described the punctuated conversion of organic matter to petroleum. Presumptions that a process will have particular temporal qualities can blind the brightest workers to understanding the process, even when data clearly indicate the obvious.

As a college learner, one achieves knowledge in classes with a reasonable investment of effort, and these efforts characterize the "common events" of the college experience. Individuals also have days when they make little progress or take a break from effort. When one faces a major open-ended challenge, such as a research project or thesis, mere acquisition of knowledge no longer suffices to produce a solution. Effort may increase, and if no solution occurs, the effort becomes accompanied by anxiety and frustration. However, with perseverance, there comes suddenly the "Aha!" moment. It may be a breakthrough solution, or it may be a realization of why particular efforts constitute an approach destined to fail. In either case, there is an unprecedented understanding of the problem and what it takes to solve it—an abrupt realization and clarity neither attained gradually nor at a predicted time. It leaves a permanent change in the mind (or a culture) analogous to the quality of *Time's Arrow* described by Stephen Jay Gould. There is no return to the old anxiety, fear or lack of understanding. Instead, the clarity arrives with a "high" of excitement, confidence and enthusiasm. Such are the feelings that most teachers know through experience and aspire for their students to share.

Age

Physiologic changes account for special challenges in meeting needs of introductory students. The adolescent brain makes rapid transition to adult thinking through increased activation and development of the frontal lobes (see Sylwester 2002; Leamnson, 2000). This occurs generally from late teens through early twenties, so it is not surprising that students with traits of adult thinkers (Perry, 1999; King and Kitchener, 1995) coexist in freshman classes with those in the late developmental stage of children (Inhelder and Piaget, 1958). Introductory courses pose tough challenges for instructors who must meet needs of students on both sides of the adolescent-adult transition.

Professors' age and experience often increase the need for effort in relating with their students. Younger professors launching their first courses often master material only a short time ahead of their students and need to spend more time in content learning than their more experienced colleagues. By virtue of similar cultural experience and their own current struggles to learn, many relate easily, almost intuitively, to students' needs. Older professors have better mastery of content and resources, and their years of learning permit them to see beautiful and subtle interconnections that are not possible without such depth. However, intellectual growth can come with decreased ability to reach students, who cannot comprehend the connections that such professors now wish to communicate and explore. When professors complain that today's students are not so engaged or prepared as those encountered earlier in their careers, they should realize that the perception can come as result of the professor's own growth and not always from increasing inferiority in her/his recent students. Experience brings with it increased necessity

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to devote more attention to seeing needs of students, because understanding these needs no longer will come as easily or intuitively. Better health care and technology have combined to extend human longevity and productive capabilities. Many college students and the faculty in general are older than in the past. Recent work supports credibility for solid cognitive abilities of older students and teachers (Leamnson, 2002), and contradicts the stereotypical "old dogs can't learn new tricks" view once accepted as popular wisdom.

Ordering of Events

Random distribution of knowledge—teaching in a sequence that might have been designed by throwing dice— doesn't optimize learning. Ordering of events relates to course and curricular organization, and good organization is among the most critical teaching practices conducive to learning (Feldman, 1998). The fractal nature of learning dictates that the cognitive and affective messages conveyed at the start of a course build recursively in the brain and exert disproportional influence. The importance of first days of classes have been deduced by many educators. Titles like *Successful Beginnings for College Teaching* (McGlynn, 2001) thus seem inevitable.

The sequential development of ideas essential to the frameworks of reasoning in disciplines are sometimes strikingly recapitulated in the ordering of topics in a general text or in courses presented in a curriculum—even when presenting historical development is far from the minds of the authors/designers. There are usually reasons that necessitated a particular sequence, and it is insightful to examine the development of one's own discipline and to learn not just where ideas came from, but *why* they developed in a certain order.

The importance of order clearly manifests from the work with intellectual and ethical development of college students. The order is solidly established based on data from both males and females from a variety of institutions. Every worker who has built a credible database and sought to classify adult thinking has come up with a similar taxonomic pattern to that of Perry (1999). The progression of events from low-level into high level thinking applies generally to humans. There are few if any documented advances from dualistic thinking into good evaluative thinking without passing through the intermediate stages. An instructor will benefit by consulting any of the taxonomies based on good data. They are too important to ignore, because understanding the stage that typifies the present development of one's students is paramount to designing "just-in-time teaching" that will successfully match students' needs. A program without a clear plan for a curriculum to advance students through the necessary order of thinking will produce few graduates capable of sophisticated reasoning, and only then through mere luck. The teacher who launches into an endeavor based primarily on what he/she wants to teach rather than on awareness of students' needs and capabilities unwittingly initiates a horrific experience for all.

Faculty development topics are appreciated when aligned with the sequence of the semester. For example, Faculty Development Associates aligns its posted teaching tips in this manner at http://developfaculty.com/tips.html. Prior to the start of the term, one gets tips on building an effective syllabus and conducting an effective initial class meeting. Soon thereafter, one may find an article on managing the first exam. Late in the term, one finds tips on managing student evaluations or conducting an effective closing class meeting, *etc*. At any one time, there are several tips available to the user of the page.

The next *Nutshell* will conclude with the temporal qualities of duration, frequency, and rate.

BOOT CAMP for PROFS® 2006!

Registration is open with spaces now held for ISU faculty.
See http://www.isu.edu/ctl/nutshells/old_nutshells/6_606.htm for details.
Contact nuhfed@isu.edu if interested.

New Faculty Orientation Scheduled
August 15 & 16, 2006!

More detail to follow. If you have new faculty in your units, please avoid causing conflicts for them by scheduling meetings, etc. on these dates.

the Center for Teaching & Learning

NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

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Perceiving Teaching's Temporal Temperaments (3) - Duration, Frequency, and Rate

SEEKING TUTORS for 2006-2007!

Faculty, we are always looking for good tutors. In the past, we have sought out tutors when students requested them. To be more proactive, we would like to collect a list of names for contact as potential tutors. Tutors for the Center for Teaching and Learning (CeTL) must have a "B" or better in the course they tutor and undergo a few hours of training. **Before good students get away**, please contact a couple who would be good potential tutors and ask their permission to send their names along with the name and number of their course to CeTL via email to **lecosuza@isu.edu.** As student requests begin in fall, we will contact potential tutors from your lists.

This *Nutshell* continues from v14, n2 & n3 with the conceptual theme of change through time, as applied to teaching and learning at the college level.

Duration

Hurricane Ivan devastated Grenada, not simply because it was a major storm, but because it stalled on the island instead of passing through quickly. The incredible destruction resulted from power applied over long duration. Duration falls particularly within the topic of "time management" often addressed in helpful references for both students and professors. Part of becoming a successful professional lies in accurately estimating the duration of time needed to accomplish a task. New students and new professors most often experience surprise at the duration needed to learn and to teach well. Duration is also a concern of scheduling. Short class periods designed for lectures are not the best fit for active methods that often produce better learning (Millis and Cottell, 1998, pp. 29-31).

Research in education shows that duration, or "time on task" is critical to better cognitive learning (Weimer, 2002, p. 31). Every major research study on development of high-level thinking shows that it can't come through the exposure provided by a single sixteen-week course, and there are no shortcuts to deep learning. Producing transitions from low- to high-level thinking may take two or more years in a sequence of classes designed deliberately to produce it (Pavelich and Moore, 1996). Further, when the required experience isn't provided over sufficient duration, people don't develop sophisticated abilities to use evidence well for decisions. When such occurs, the transition from Perry Stage 4 to 5 is punctuated—a celebratory "Aha moment!" Duration thus lies at the juncture of the conflict between educating students for deep learning *versus* pressures to process students by merely getting them through requirements and programs. Pressures come from one side by students whose busy lives don't permit easy allocation of sufficient time for deep learning and from another by legislators, who are impatient to move graduates from college to the work force as quickly as possible. Development of "wisdom" or "emotional intelligence," meaningful qualities similar to those described for the highest Perry stages, seem to require even longer duration than one can expect to spend in college. Purposeful personal development over longer time melds cognitive development with affective awareness and maturity—a melding valuable to the individual who has achieved it.

Frequency

California and Japan have long employed exceptional earthquake building codes, but the Midwestern region around Missouri, until recently, did not. Both regions have strong earthquakes, but different frequencies of events between regions accounts for the regional difference in response to the problem. The former areas have frequent small, perceptible tremors. Although not damaging, they keep citizens aware of the potential for catastrophic events. The latter region also has catastrophic earthquakes (the last major ones taking place around 1811 and 1812), but the tremors in the intervening time are deep, perceptible only to sensitive instruments, and provide no frequent reminders of the real danger. Planning a good educational experience also involves attention to frequency of events. If a teacher says: "I already told students that. It's up to them to get it," the teacher should remember that even a catastrophic earthquake quickly passes from the minds of a population if there are not frequent reminders.

Cognitive psychologists have long known that repetition increases long-term retention of material. If a teacher knows that particular knowledge or skills are important, he/she should design course experiences that make use of that knowledge or skill with frequency that is proportional to importance. Justification to use frequent quizzes rather than infrequent exams includes a reminder to maintain pace that prevents binge cramming. "Mastery learning," characterized by repetition, testing and retesting, brings excellent results. In faculty development, frequent one-page newsletters produce better response than do infrequent long (8 to 16 pages) ones.

All *Nutshell Notes* areposted at **http://www.isu.edu/ctl/nutshells/index.html** where web sites referred to are hot-linked.

Continued on other side with important announcements

Rate

Rate differences in geology are illustrated by the contrast between soil creeping down a grassy meadow at the rate of a few cm/decade and a rock avalanche moving at over 300 km/hr. Implications for land use are vastly different at these extremes. Rate has its educational equivalent in pacing—the amount of material covered over a given time. Pacing is a statistically significant aspect of instruction (Erdle and Murray, 1986). Pacing considerations in course planning should aim to optimize a challenge by matching it to the amount that the students of the institution can realistically learn through a class session, a course, or a program. More coverage seldom translates into more learning. Careful course design for pacing can lead sincere students across the proverbial meadow with learning intact. Becoming fascinated by content coverage is likely to bury understanding in the proverbial avalanche of information, and this leave only a few scarred survivors.

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Nutshell Notes v14n2 through v14n4 derive from two of about twenty articles by Dr. Edward Nuhfer in *National Teaching and Learning Forum* provided under the theme "Educating in Fractal Patterns." *National Teaching and Learning Forum* and its searchable archives are available to all ISU employees and students from any on-campus computer at **http://www.ntlf.com/**. Nuhfer is a professor of geoscience and directs the Center for Teaching and Learning. at Idaho State University. A synopsis of fractal concepts appears in *To Improve the Academy*, 2007, in press.

the Center for Teaching & Learning

NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

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Increasing Retention by Increasing Student Success - Part 1 Surface and Deep Learning

This Nutshell begins a series that focuses on increasing students' learning and their enthusiasm for learning. The series taps details from past Nutshells and our institutional on-line subscription to National Teaching and Learning Forum. These are available through on-line archives at http://www.isu.edu/ctl/nutshells/index.htmland http://www.ntlf.com/restricted/ respectively. The latter site is available only from computers on the ISU campuses.

President Vailas' July 5 Convocation message conveyed that student retention is everyone's challenge at ISU. Normally, I cease writing Nutshells in the summer when most faculty are away, but the retention initiative is an important one that we can get behind quickly, and this makes it useful to kick-start the year with some summer issues. Retention increases when students are both successful and enthused learners. In an optimal setting for learning, students: (1) are aware of the differences in approach needed to master surface learning and deep learning; (2) have clear messages about what constitutes high expectations; (3) feel supported in their efforts to meet these expectations by an active learning community with a signature identity, and (4) can self-assess and derive satisfaction from the quality of their learning. We will deal mainly with the first of the four in this Nutshell. In the final issue of the series, we'll deal with assessment tools that are both useful to promote good learning design and show that specific learning occurred.

Achieving the four components involves being attentive to students' cognitive, affective, and psychomotor domains. In January 2003, Bob Leamnson delivered the first February University-wide faculty development workshop to over 110 ISU faculty. Approximately 160 ISU faculty now own Leamnson's book, *Thinking About Teaching and Learning*, which addresses learning at the neurological level as the building and stabilization of synaptic connections (NNv8n8&9; NNv11n1). As instructors, we find it obvious to strive to develop cognitive growth related to the content of our disciplines. Less obvious is the fact that the neural network of the cognitive domain we seek to develop is inextricably connected with the affective and kinesthetic (psychomotor) domains. Student success that leads to retention involves understanding of how to employ all three—the more of the brain that we design our learning activities to employ, the more neural connections our students are able to build.

Surface learning involves largely what students know. Knowing rests largely in the lower two levels of recall and comprehension of Bloom's taxonomy of the cognitive domain (NNv9n1) and in many simple computational challenges of Bloom's third level (application). Placing recall and comprehension in the lower cognitive levels does not translate into these being easy tasks, and an inability to learn large amounts of factual information quickly can be discouraging and cause students to give up. A way to assist with the difficulty is to first design good learning activities as models and second to teach students how to design their own in order to manage these learning tasks. Lecturing facts to students and simply telling them to go and memorize is perhaps the least effective of all methods to promote desired learning. In-class games and drills (see visible quiz in NNv12n2 at http://www.isu.edu/ctl/nutshells/nutshell12-2.html) puzzles (crosswords are good), and content-rich games done in pairs and groups with short discussions at the start of class are much better. The challenges posed by the drills should represent in content and difficulty the challenges on graded tests that we will hold students accountable to know. The best learning occurs after students master design of their own memory aids and learning enhancement exercises. One may catalyze this after the class has experienced several instructor-designed lessons for learning as models. Students are then assigned to design and provide a learning experience for a block of content for the rest of their small group. The act helps to convey how much work that it actually takes to master a block of low-level knowledge and does so by providing a support group (nurtures affective domain) through which

Continued on other side with important announcements

to encourage, discuss, and develop this very necessary awareness about learning. In contrast to learning in isolation and silence through rote memorization, group discussion and visualization draw in involvement of the psychomotor domain, thus building and stabilizing more synaptic connections at a faster pace. The second February development workshop in 2004 featured Dr. Barbara Millis, who provided training to over 120 ISU faculty. Other ISU attendants at the Boot Camp for Profs® program bring the total ISU faculty who have achieved training and have Millis' and Cottell's book, *Cooperative Learning for Higher Education Faculty*, to about 160 . Consult this book for help in designing your own learning exercises with groups.

In contrast to knowing, deep learning focuses largely on expanding what students can do. Students who succeed at deep learning must not merely be exposed to the higher Bloom stages of synthesis and evaluation, but they must eventually understand what it means to do synthesis and evaluation well (see NNv10n1&n2). Such sophistication in achievement of high level thinking skills requires (a) awareness of employing a framework of reasoning; (b) a good use of evidence, and (c) self-reflection for metacognitive awareness. The fourth University-wide faculty development workshop in 2006 with Susan Wolcott (see http://www.idea.ksu.edu/papers/Idea_Paper_37.pdf) focused on the differences in thinking between students who value only surface learning and students able to perceive deep learning as the outcome of a higher quality education. About 160 ISU faculty have King and Kitchener's *Developing Reflective Judgment* book, which offers detailed research about the characteristics of student achievement displayed at different levels of thinking.

Why should students' lack of awareness about surface learning and deep learning be related to retention? A part of the answer is that most students are unable to distinguish becoming credentialed with a degree to becoming educated through acquiring higher level thinking abilities. Such students see a college degree as a ticket to getting a job but don't think beyond job acquisition to acquiring skills needed for either keeping that job or for career advancement. The view of education-as-ticket leads to perceiving any content not immediately applicable to their chosen specialized majors as a delaying impediment. Curricular requirements then become viewed as simply obstacles to overcome through seat time spent in surface learning of more facts. On the other hand, if a student perceives the nature of deep learning, she/he understands the content as opportunity to master varied frameworks of reasoning and to deal effectively with divergent, open-ended problems that typify real career challenges in making sound, informed decisions. These skills, rather than surface learning, are what provide the ability for career advancement or to transition rapidly into new areas of opportunity.

Generating and assessing deep learning involves work that is *initially* neither easy for students nor professors. Learning for short-answer tests that define achievement based largely on knowing as manifested in test-taking skills under timed conditions is no longer sufficient. Instead, deep learning requires students to develop other neural networks that can deal in sophisticated ways with open-ended challenges through projects and written reports that involve students' generating products through discussion, reflection, and revision. These serve as much to promote learning and to mentor students to high-level thinking as to produce grades. Students will initially resist changes toward higher level thinking (see NNv8n3) unless/until they can grasp the essence and purpose of it. If institutions do not support both professors and students in this difficult transition, the institutional signature dissolves into what George Kuh (Change Magazine, 2003, v. 35, n. 2) terms "the disengagement compact: 'I'll leave you alone if you leave me alone.' That is, I won't make you work too hard (read a lot, write a lot) so that I won't have to grade as many papers or explain why you are not performing well."

The neural development changes that allow the shift from shallow to true deep learning require longer than a sixteen-week semester and cannot be achieved through a single course. However, a planned curriculum that develops these abilities over several semesters can achieve desired results (Pavelich and Moore, 1996, Journal of Engineering Education, October, pp. 287-292). Without such curricula, students' reasoning abilities change little between high school and college graduations. Students in a school permeated by Kuh's "disengagement compact" can be totally satisfied and oblivious to the severe disservice being done through such a compact.

Students should receive an introduction to the differences between shallow and deep learning in their orientations and first year seminar experiences. This introduction needs to be reinforced repeatedly in subsequent courses until familiarity becomes part of the institutional culture.

The Center for Teaching and Learning will begin a special series of Friday noon - 1:00 workshops on the theme "Teaching for Student Success" in Museum Building 432. Watch for further announcements.

the Center for Teaching & Learning

NUTSHELL NOTES

"Teaching tips in a nutshell" — Idaho State University's One-page Newsletter for Teaching Excellence

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Increasing Retention through Student Success - Part 2: The First Day of Class

Our last Nutshell noted that students, in general, begin college operating under the concept that becoming educated involves mainly surface learning, which they will ideally engage at the level of application. Application provides a satisfying connection to learning, because it reinforces the relationship of education to professional practice. Most students believe that they are in college primarily to become qualified to enter a profession, but their concept of "qualified" is in its earliest beginnings, and their ideas about the process of cognitive development over time bear little resemblance to the actual developmental stages (NN v.8 n. 1-6 http://www.isu.edu/ctl/nutshells/index.html). When we receive comments such as "Just give us the facts," or "Why should I have to learn this? I'll never use this stuff," we need to see such comments for what they are—honest expressions of the student's operational model about education.

All of us develop neural networks that contain self-generated conceptual models. It seems correct to use these so long as they satisfactorily explain our experiences. When experiences are limited, erroneous concepts are rarely challenged. When stabilized by repeated affirmations of peers with similar experience, these can be so difficult to replace that they persist over a lifetime. An impressive illustration of the strength of such models can be found in a short documentary film, "A Private Universe." (This is available at http://www.learner.org/resources/series28.html, with a free sign-up, but can be difficult at times to view from the ISU campus servers—try ISU first, but, if frustrated, go to an internet coffee shop). In the film, interviewers at Harvard's graduation ceremony asked graduates to explain simple physical phenomena, such as seasons. Those interviewed responded with fantastic explanations, typical of those offered by grade-school children. The interviews reveal that flawed, self-generated models, including those formed by the minds of the brightest, can resist even a Harvard education (NTLF v. 15 n. 4 pp. 8-11 through http://www.ntlf.com/restricted/).

The "Private Universe" study reveals the challenge faced in helping students replace their self-generated concepts about thinking and learning with those that are truly effective. The usual instructional method, the lecture, is not powerful enough to efficiently replace many self-generated concepts. However, interactive learning methods are more effective, particularly for students at risk. One of the most definitive proofs of the power of interaction comes from the work of Richard Hake (Figure 1). Hake used standardized tests created by content experts to document that students who engage in learning difficult and conceptually counter-intuitive material make twice the learning gains through interactive methods that they make through traditional lecture-lab. Figure 1 gives us some consolation about the risk of trying such methods: the worst interactive engagement exercises produce results comparable with the best gains from traditional lectures.

Because we cannot change the minds of students most in need of change through lecture, we might better succeed by using our time to design interactive learning experiences than in perfecting our lectures. Interactive experiences help students confront and perceive the limits of their self-generated models, and then replace flawed concepts themselves.

So, what about all this makes the first day of class so important? The importance arises because any class is initially an unknown to students, and the brain reacts to surprise by starting to form new models that have the strength to grow and to displace flawed models. The concept of learning that many will bring to our classes carries expectations that they can learn effectively by watching us work at the board, taking good notes, and memorizing the facts we and textbooks provide. Their concept may even extend to associating a high quality education with scoring well on short-answer examinations. The first class offers superb opportunity for the surprise needed to replace such models.

We need to address both the affective and cognitive domains at this time. The importance of the affective domain is frequently discounted, but it is inextricably

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linked with all content processed by the cognitive domain. Attention to affective feelings of students is important--affective first impressions in a class will ultimately influence mastery of content in that class (NTLF v.14, n.1, pp. 9-11 at http://www.ntlf.com/restricted/). Should anyone doubt the power of the affective domain and the initial class meeting, reflect for a moment on the work of Ambady and Rosenthal (1993). Their "thin slices" studies determined that, after watching thirty seconds of silent, content-free video, students arrived at ratings for teachers that were highly consistent (r = 0.76) with end-of-semester ratings. If we can successfully convey positive, informative messages about our expectations on the first day, students can more willingly move beyond surface learning as the course progresses.

In addition to disclosure of process, the disclosure of content at the start of a course prompts students to confront preconceptions about what they will learn and the levels of challenge they must rise to. Good content/challenge disclosure can be provided by a well-written knowledge survey (http://www.isu.edu/ctl/facultydev/KnowS_files/KnowS.htm), which offers students opportunity to reflectively and repeatedly engage course content in detail. Knowledge surveys, like all instruments, can be used ineptly, but when employed skillfully, they furnish much of the structure that is so essential for permitting under-prepared students to begin to succeed.

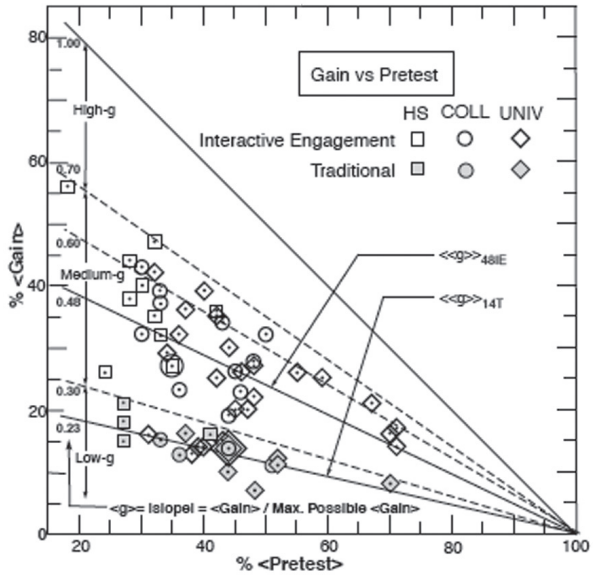

Figure 1 (reproduced by permission—from Hake, 2002 and derived from Hake, 1998a and 1998b). The figure shows clearly the greater gains in learning physics obtained by using interactive engagement methods for instruction over traditional lecture instruction. Hake uses several gain terms. In all, the angle brackets indicate the average obtained from use of paired pre- or post-tests in the course: (A) %<Gain> is the *absolute (or actual) gain,* which is equal to [%<post-test> – %<pre-test>]; (B) %<Gain>max is the *maximum possible gain* and is equal to [100-<pre-test>]; (C) The *average normalized gain* <g> = [average absolute gain] / [average maximum possible gain>] The double brackets as in $\langle\langle g\rangle\rangle_{48IE}$ indicate the average normalized gain for 48 interactive classes and the $\langle\langle g\rangle\rangle_{14T}$ indicate the average normalized gain for 14 traditional (dominantly lecture) classes.

One opportunity for a first class lies in introducing students to the practice of expanding their own thinking with the aid of one another. For example, in a science class, an instructor might ask all students to complete the sentence: "Science is...," followed by comparing results within small groups, then summarizing key ideas from the entire class. Inviting students to explore their present knowledge, right or wrong, and then to revise and extend that knowledge, conveys that the class is a supportive place where students and teachers act and think together, rather than a place where students simply sit, listen, and perhaps worry about failure.

It is usually easy to construct an initial interactive experience that will engage students in confronting their ideas about some relevant content through groups or at least pairs. Initial engagement of material with a group helps remove fear of failure through the message that students have support to succeed from one another as well as from us. It provides an opportunity for us to discuss and for students to experience the benefits of learning in groups. An interactive experience launches engagement by using more of the brain than would be used if they simply hear lecture. Given the importance of first encounters, we want students to engage as much of their brains as possible, so that they more effectively set in place the relevant neural structures that they can build on.

Obviously, this newsletter focussed on actions we professors can take. The expectation of student responsibility is the other side of the coin. When students do not attend class, they cannot benefit from interaction. Delivering the message that attendance is necessary for success is an instructor responsibility, but not the sole responsibility of instructors. Efforts to increase student success demand this be addressed as an institutional expectation.

References cited are available on the web archive of this Nutshell through http://www.isu.edu/ctl/nutshells/index.html.