



An Agency of the Texas Association of Community Colleges

Connecting CATs and CoLTs

Participant Packet

March 25, 2004

1:30 - 3:00 PM CT

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AGENDA

Introduction..... Tom Angelo

The Whys of Collaborative Learning K. Patricia Cross and Tom Angelo

Four Types of Connections K. Patricia Cross and Tom Angelo

Classroom Example: "Think-Pair-Share" Elizabeth Barkley
Foothill-DeAnza Community College

Social Connections K. Patricia Cross and Tom Angelo

Classroom Example: "Group Grid" Elizabeth Barkley

Experiential Connections K. Patricia Cross and Tom Angelo

Caveats and Guidelines for Success Tom Angelo

Q & A Tom Angelo

Close Tom Angelo

EMAIL/FAX/CALL-IN INSTRUCTIONS

There are three ways in which you can interact with the panelists:



E-MAIL: Before the program, you may e-mail your questions for the panelists to hartman@dccd.edu and they will address them during the teleconference.



FAX: Before March 25, fax to 972.669.6699

On March 25, fax to 972.669.6633



CALL: You are encouraged at any time during the program to call in your questions and comments.

The toll-free telephone number for call-in questions is:

1.800.745.0371

HOW IT WORKS: Your call will be answered by a member of our staff, who will ask for your name and site location. You will then be put on hold. While you are on hold, you will be able to hear the videoconference through the telephone. Stay on the line so we can communicate with you if necessary.

If your call should be accidentally disconnected, call again and tell the operator you were disconnected while waiting to ask a question.

When prompted or introduced by the program host, give your name and site location, and state your questions as clearly and succinctly as you can. Please be aware that while you are asking your question and while it is being answered you will be “on the air.” Please remain on the line until your question has been answered and your call has been disconnected.

BETTER AUDIO: To minimize the possibility of any technical or program difficulties that may be caused by audio feedback, we suggest you locate the telephone away from the audio speaker at your site.

PRESENTERS:



Tom Angelo is currently Associate Provost for Teaching, Learning and Faculty Development, and Professor of Education at the University of Akron. He has also headed up learning centers at DePaul University, University of Miami, and Boston University. His publications include *Classroom Assessment Techniques* (with K. Patricia Cross, 1993) and *Classroom Assessment and Classroom Research: An Update on Uses, Approaches, and Research Findings* (1998). Since receiving his doctorate from Harvard's Graduate School of Education Dr Angelo has held fellowships from the Fulbright Program in Italy, the Gulberkian Foundation in Portugal, and served as a visiting scholar for the Higher Education Research and Development Society in Australia. In 1988 he was named one of America's 40 Young Leaders of the Academy by *Change Magazine*.



K. Patricia Cross is Professor of Higher Education, Emerita at the University of California at Berkeley. The author of eight books and more than 200 articles, monographs, and chapters, Cross has been recognized for her scholarship by election to the National Academy of Education, receipt of the E.F. Lindquist Award from the American Educational Research Association, the Sidney Suslow Award from the Association for Institutional Research, and the Howard Bowen Distinguished Career Award from the Association for the Study of Higher Education. She was voted one of "the most influential voices" in higher education in a *Change Magazine* poll in 1975, and when the poll was repeated in 1998, she was again selected as a national leader. Elected Chair of the Board of the American Association of Higher Education twice (1975 and 1989), she has received many awards for her leadership in education, among them the Leadership award from the American Association of Community and Junior colleges, the Outstanding Service Award from the Coalition of Adult Education Organizations, the award for outstanding contributions to the improvement of instruction from the National Council of Instructional Administrators, and the Academic Leadership Award from the Council of Independent Colleges. She has been awarded 15 honorary degrees and is listed in *Who's Who in America*, *International Who's Who of Women*, and *Who's Who in American Education*. She is currently a Trustee of the Carnegie Foundation for the Advancement of Teaching, a member of the Board of Directors of Elderhostel and the National Selection Committee for the Hesburgh Award, and a Senior Fellow of the League for Innovation in the Community College.

TWO DEFINITIONS

Classroom Assessment is a simple method faculty can use to collect feedback, early and often, on how well their students are learning what they are being taught. The purpose of classroom assessment is to provide faculty and students with information and insights needed to improve teaching effectiveness and learning quality. College instructors use feedback gleaned through Classroom Assessment to inform adjustments in their teaching. Faculty also share feedback with students, using it to help them improve their learning strategies and study habits in order to become more independent, successful learners. . . . Classroom Assessment is one method of inquiry within the framework of Classroom Research, a broader approach to improving teaching and learning.

Angelo, T. A. (1991). Ten easy pieces: Assessing higher learning in four dimensions. In T. A. Angelo (ed.) *Classroom Research: Early Lessons from Success*. San Francisco: Jossey-Bass. *New Directions for Teaching and Learning*, no. 46, 17-31.

Collaborative Learning refers to those learning activities intentionally designed and assigned to be carried out by pairs or small groups of students. In addition to intentional design, two other elements are key to this definition. Co-laboring is the second necessary element. All participants in the group must engage actively in working together toward the stated objectives. If only one of two, or two of five group members complete a group task while the others watch, that does not constitute collaborative learning - or at least not effective collaborative learning. Whether all group members are assigned exactly the same task, or different pieces of a large assignment, they must all contribute more or less equally. Even active, equitable engagement of each member of the group in completing an assigned collaborative task is not sufficient, however. The third requirement is that meaningful learning - achieving the intended instructional goals - take place through that intentional, engaged collaboration. Others call this kind of activity cooperative learning, team learning, group learning, or peer-assisted learning - and philosophical differences sometimes lie behind the different labels. . . . Collaborative Learning Techniques, or CoLTs for short, are mainly simple and flexible tools that can be adapted to fit a wide variety of disciplines, instructional goals, and learning contexts.

Angelo, T.A. (2003). personal communication

THE WHYS OF COLLABORATIVE LEARNING: A THEORETICAL OVERVIEW

by K. Patricia Cross

Why is there so much interest in Collaborative Learning?

1. Accountability Movement

- First time in history – colleges accountable
- 1980s reports and studies critical of education
- Paradigm shift — From “providing instruction” to “producing learning”

2. Advances in Knowledge About Learning

- Phenomenal increase in knowledge about learning.

Why should we take Collaborative Learning seriously?

- Collaborative Learning is an effective way to engage students in making connections –not the only way, but Collaborative Learning incorporates much of the research about learning.
- Five elements considered essential to Collaborative Learning:
 1. Positive interdependence – success of the individual linked to success of the group.
 2. Promotive interaction – instead of competing, students are cooperating.
 3. Both indiv and group held accountable. Grades are the coin of the realm.
 4. Students required to develop team work skills. Important in growing number of jobs from scientists exploring space to health and social work teams to marketing teams.
 5. Students and teachers evaluate group process. An important part of any learning is reflecting on what went well and where improvements could be made.

The Four Types of Connections in learning and their importance:

1. Neurological Connections - Brain will shrink from disuse. Use it or lose it.
2. Cognitive Connections – Cognitive psychology – schema.
3. Social connections
4. Experiential connections – bring real life in

Social Connections:

Especially important to CC because:

1. commuter campus
2. diversity on every dimension – ethnicity, age, achievement, culture, family income, etc.
 - different cultures – easier to speak in small group, language, self-confidence, vast differences in achievement

- Critically important in democracy to get different points of view
- Homogeneous vs. heterogeneous groupings

3) Peer tutoring—

McKeachie –From 500 studies of teaching effectiveness. “What is the most effective way of teaching? It depends on the goal, the student, the content, and the teacher, but the next best answer is “students teaching other students.”

Experiential Connections:

- Bring reality into the classroom – case studies and problem-based
- Take knowledge into the real world – internships, apprenticeships
- Classroom model – Service Learning

CAVEATS FOR USING COLLABORATIVE LEARNING

by Claire Major, University of Alabama, Birmingham

Steep Learning Curve. Doing anything new and important always involves a learning curve, and the curve may be particularly steep when trying a collaborative learning approach for the first time.

Discomfort with Teacher Role. Instructors move from expert authority to sharing responsibility for learning with students. A teacher may have been a “sage on the stage” but is now as facilitator or “guide on the side.”

Discomfort with Student Role. The students, who have been in other classes in which teachers tell them everything they are supposed to know, don’t appreciate having this support suddenly withdrawn from them. They also don’t like having to “learn the rules of a new game,” particularly when they have been good at the old game.

Changes in Student Ratings. Sometimes instructors who are effective lecturers get lower student ratings when they start using active and cooperative learning methods, either because they are new to it, or because traditional ratings tend to measure traditional teaching. This can be discouraging.

Complaints From Students: If they don’t know what to expect, students can be vocal about the unfamiliar. They may say things like:

- X never teaches us anything
- We have to teach ourselves
- I don’t pay tuition to teach myself
- My team members don’t pull their weight
- I’m slowed down by having to explain everything to the other students in my group.

Increased Class Time. Collaborative learning will likely take longer than planned, particularly when teachers try it for the first time.

It’s important to remember: These early glitches are natural and common and are not cause for panic.

Tips for Success

Set the stage. It’s important to tell students what you’re going to do and why. I reinforce the point by citing some of the research that explain the benefits of collaborative learning and about the research that says what employers want from graduates.

Provide coaching on the skills you want the students to develop. Students will generally make it known when they lack a particular set of skills—they may complain, they may not be using the skills when it’s apparent that they should, etc. If you truly value those skills and they are essential to success in your course, then it’s important to spend the time teaching them.

Align teaching goals with Collaborative Learning Techniques. It’s important to avoid doing collaborative learning for collaborative learning’s sake. You should be clear on what it is you want to accomplish and how the particular technique can help you accomplish it.

Be involved in facilitation of groups. Just because your role changes in a collaborative learning class, that doesn’t mean that the new role is not just as essential as the old—it is in deed a rich and

complex activity. It's important to introduce the task well, to be on hand to answer clarification questions, to observe group interactions, and to intervene when groups are not self-facilitating and problems arise.

Let students work things out for themselves when ever possible. Groups go through a normal process. Tuckman describes these stages as forming, storming, forming, and performing—later added adjourning. It is normal for groups to hit bumps in the road and they need time to work through things on their own.

Get feedback and try to be responsive to it. Angleo and Cross say “don't ask if you don't want to know.” If you do want to know, it's important to listen—even if it's not really pleasant to hear what can be improved. It may help you make positive changes, though.

Go back to the references periodically. There's lots of good information out there in the literature on collaborative learning, and it can be quite useful to return to these sources from time to time. You may be reminding of things that you have forgotten.

Give it time—Give it enough time so that you become comfortable in a new role, so that students do, so that you can learn from your mistakes—and from student mistakes, and so that you start seeing the real benefits, the real payoffs, of active, collaborative learning.

CAVEATS

by Tom Angelo

Making groupwork work well requires:

- An Appropriate Task or Assignment
- Positive Interdependence
- Supportive Interaction
- Effective Teamwork Skills
- Individual Accountability & Personal Responsibility
- Individual Reflection & Group Processing
- Consequential Assessment & Follow Up

Planning Collaborative Learning – 10 Key Questions

1. How appropriate is collaboration for achieving the stated teaching and learning goals?
2. How appropriate is the assignment for collaboration?
3. How clear are the expected learning outcomes?
4. How clear are the evaluation criteria and standards?
5. How clear is the collaborative process?
6. How clear are the learners' roles and responsibilities?
7. How clear is the instructor's role and responsibilities?
8. How well prepared are the students?
9. What formative feedback will they get and when?
10. What problem-solving resources are available to learners when problems arise ?

COLLABORATIVE LEARNING TECHNIQUE

Analytic Teams

Listening to a lecture, watching a video, or reading an assignment can be passive activities for students. One way to engage students more fully is to form structured teams to analyze and discuss various aspects of the task.

Estimated Time and Effort Required for

Faculty to prepare this CoLT **MEDIUM**

Students to use this CoLT **MEDIUM**

Faculty to assess/follow up **MEDIUM**

Complexity **MEDIUM**

Risk of Failure **LOW**

Duration & Location **15-60 minutes/In or out of class**

Group Size & Structure **Quartets or Quintets/Formal/Some pre-organizing needed**

Description

This CoLT analyzes, or breaks down processes we expect individual students to engage in when critically reading, listening, or viewing into several specific tasks that are then distributed among different individuals or teams. This division of labor allows students to concentrate on learning and performing one aspect at a time of these complex critical thinking processes and to see how re-combining the different tasks through groupwork can contribute to their understanding and learning. In preparing this technique, the most challenging aspect is determining how to follow up on the groupwork in a way that will help students meaningfully synthesize the various information and opinions they have heard.

Procedure

1. Form student groups of four or five, assigning each individual in the team, or each team, one of the following roles:

Summarizers - Prepare a summary of no more than seven most important points

Questioners - Prepare at least three substantive questions about the material.

Proponents — List at least three points you agreed with and state why.

Critics - List at least two points you disagreed with or found unhelpful and state why.

Example givers - Give at least three examples of key concepts presented.

Make certain that students understand the purpose of the exercise and the intended outcomes.

2. Present the lecture, show the video, or assign the reading. The actual listening, viewing, or reading can take place in or out of class or, in some cases, on line.

3. Give teams some class time to prepare to present their analyses, whether as oral or written presentations. Again, these can be done online. Specify and limit what each team will be responsible for presenting, to avoid unhelpful repetition. Assign clear time/length limits.

4. Follow up group presentations with individual assignments that build on and extend this exercise.

APPLICATIONS CARD

DIRECTIONS: Please take a moment to recall the ideas, techniques, and strategies we've discussed — and those you've thought up — to this point in the session. Quickly list as many possible applications as you can. Don't censor yourself! These are merely possibilities. You can always evaluate the desirability and/or feasibility of these application ideas later.

Interesting

IDEAS/TECHNIQUES

from this session

Some possible

APPLICATIONS of those

ideas/techniques to my work

Reference: Angelo, T.A. & Cross, K.P. Classroom Assessment Techniques: A Handbook for College Teachers, 2nd edition. San Francisco: Jossey-Bass, 1993, pp. 236-239.

COLLABORATIVE LEARNING TECHNIQUE

Test-Taking Teams

Essential Characteristics

- Group Size 4-6
- Time on Task PROPORTIONAL TO EXAM
- Duration of Groups PROPORTIONAL TO EXAM
- Online Transferability MODERATE

Description and Purpose

Students work in teams to prepare for instructor-created exams and then take the exams first individually and next as a group. This CoLT thus involves three steps: 1) the group studies for the exam together, 2) individuals take the exam, and 3) the group takes the exam. By working together to prepare for the exam, students help each other deepen their understanding of the content. Because each student first takes the test independently, this CoLT emphasizes individual accountability. By re-taking the test as a team, individual students benefit from the collective knowledge of the group. Since the group score is generally superior to the individual scores, Test-Taking Teams is useful for demonstrating the value of collaborative learning. This CoLT may be used for short quizzes within a single class period or for tests covering larger amounts of material.

Preparation

Once you have determined the content that students should master and you have presented it in lecture, reading assignment, or other activity, the preparation for this CoLT is the same as preparing a good examination for individuals. Refer to a source such as Davis' (1993) or McKeachie's (2002) chapter on testing and grading for tips on developing a good test. You may want to create a test study guide to provide students with a focused framework for preparing for the test.

Procedure

Ask students to form groups of 4-6. You may want to consider one of the instructor-stratification methods for forming groups described in Part 2 to ensure that each team contains diverse or ability-balanced membership.

Depending on the size and complexity of the material to be mastered, the groups may meet for 15 minutes, a full class session, or longer.

Administer the test for students to complete individually and to submit to the instructor for grading.

Before you return the graded individual tests, ask students to rejoin their groups to reach a consensus on the answer(s) and submit a group response to the test.

Consider averaging individual test grades and group test grades to determine individual grades. Or you may wish to weight scores, e.g., 2/3 for individual plus 1/3 for group.

COLLABORATIVE LEARNING TECHNIQUE

Talking Chips

Essential Characteristics

- Group Size 4-6|
- Time on Task 10-20 Minutes
- Duration of Groups single session
- Online Transferability LOW

Description and Purpose

In Talking Chips, students participate in a group discussion, surrendering a token each time they speak. The purpose of this CoLT is to ensure equitable participation by regulating how often each group member is allowed to speak. Because it emphasizes full and even participation from all members, this technique encourages reticent students to speak out and talkers to reflect. Talking Chips is useful for helping students discuss controversial issues, and it is also useful to solve communication or process problems, such as dominating or clashing group members.

Preparation

Determine a question or problem for group discussion. Bring poker chips, playing cards, or simply gather a sufficient number of paper clips, pencils, chalk, or other available items to class to serve as tokens.

Procedure

1. Form student groups.
2. Give each student 3-5 tokens that will serve as permission to share, contribute, or debate in the conversation.
3. Ask students to participate equally in the group discussion, specifying that as they contribute comments, they should surrender a token and place it in view of the other group members.
4. When all students have contributed to the discussion and all tokens are down, ask students to retrieve and redistribute the chips so that the procedure repeats for the next round of discussion, or end the discussion if the activity is complete.

COLLABORATIVE LEARNING TECHNIQUE

Group Grid

Essential Characteristics

Group Size	2-4
Time on Task	15-45 MINUTES
Duration of Groups	SINGLE SESSION
Online Transferability	LOW

DESCRIPTION AND PURPOSE

This CoLT is probably most useful in introductory-level courses where students are building basic schema, learning a large number of new terms, and trying to understand the categorization rules of the discipline. Organizing and classifying information helps students to clarify conceptual categories and to develop categorization skills. By making students' conceptual organization explicit and graphic, Group Grid also helps students remember the information. In this activity, students sort pieces of information by placing them in the blank cells of a grid. The grid's columns and rows consist of superordinate concepts, and student groups receive scrambled lists of subordinate terms, names, equations, images, or other items that belong in the categories. Teams sort the subordinate items into the correct grid categories.

PREPARATION

Select two or more related categories that organize course information. The simplest grid sorts information into two or three columns. More complex grids have more columns, or they may contain a second level of sorting where the top horizontal row identifies one level of organization and the far left vertical column identifies another level of organization. The item placed at the point of intersection must meet both column and row classification criteria. Write out a list of items that belong in each category.

Make a grid by drawing a large rectangle and dividing it into as many smaller rectangles as you have categories and items of information. Write the name of the categories in the top row and/or left column, leaving the remaining cells blank. Either write out the items that teams are to sort in a scrambled list on the side of the grid, or write the list on a separate piece of paper, an overhead transparency, or the chalkboard. Check to make sure you can fill out the grid yourself. You may use your grid to evaluate students' grids or to have students check the accuracy of their grids.

PROCEDURE

1. Form groups and distribute the blank grid as a handout, or have students copy it from one that you project in an overhead transparency or draw on the chalkboard.
2. Give students the list of scrambled items of information.
3. Have students fill in the blank cells of the grid. Groups can discuss and come to consensus about how the items should be sorted, and fill out the grid as a group project. Or individual students can take turns in a 'round robin' order filling in one cell per turn. Each person within the group, or each pair within a quad, can have their own writing style (cursive vs. printing) or colored markers to distinguish their contributions.
4. Students submit completed grids for assessment and evaluation, or you post a correctly completed grid for them to check for accuracy.

COLLABORATIVE LEARNING TECHNIQUE

Think-Pair-Share

Useful for stimulating engagement in discussions, checking students' understanding of concepts, and encouraging students to rehearse, express, and compare their understandings with those of others

Estimated Time and Effort Required for

Faculty to prepare this CoLT	VERY LOW
Students to use this CoLT	VERY LOW
Faculty to assess/follow up	VERY LOW

Complexity	VERY LOW
Risk of Failure	VERY LOW

Duration & Location	5-15 minutes/In class
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Group Size & Structure **Pairs or triads/Informal/No pre-organizing needed**

Description and Purpose:

The name of this CoLT, "Think-Pair-Share," captures the essential steps. In response to a question posed by the instructor, students think and perhaps write on their own for a few minutes, quickly pair up with classmates, and then share, discuss, and compare their responses in pairs before responding to the instructor or sharing with the entire class. This technique provides students with the opportunity to formulate responses and practice communicating them with their peers. Since *Think-Pair-Share* can dramatically improve students' willingness and readiness to participate, it's often used as a "warm up" or "step up" to a whole class discussion.

Procedure

1. Pose an engaging question to the class, giving students ample time to think about the question individually and to devise individual responses.
2. Ask students to pair with another student nearby to share responses and, if useful, to create a joint response by building on each other's ideas.
3. Ask the pairs to share their responses with the whole class. If time is limited and/or the class is large, randomly call on student pairs.
4. If appropriate, provide class with the correct or expert response, allowing them to check and, if needed, correct their individual and pair responses.

COLLABORATIVE LEARNING TECHNIQUE

Buzz Groups

Useful for stimulating engagement in discussions and, and encouraging students to rehearse, express, and compare their ideas, opinions, and/or reactions with others.

Estimated Time and Effort Required for

Faculty to prepare this CoLT ***LOW***

Students to use this CoLT ***LOW***

Faculty to assess/follow up ***LOW***

Complexity ***LOW***

Risk of Failure ***LOW***

Duration & Location ***10-20 minutes/In class or online***

Group Size & Structure ***Triads to Quintets Informal/Little or no pre-organizing***

Description

Buzz groups give students the opportunity to exchange ideas, opinions, and information in a low stress environment. Because buzz groups can build interest in and enthusiasm for a subject, they are useful in introducing a new topic and in assessing students' prior knowledge or beliefs about that topic. Buzz Groups can also serve as in-class lead ins to out-of-class assignments.

Procedure

1. The instructor prepares a list of open-ended discussion questions that will tap students' ideas, prior knowledge, or opinions about the topic at hand. These should be questions for which there is no one correct answer.
2. In the context of a semi-structured, time-limited conversation, small groups of students discuss their responses to the prepared questions. It may be useful to assign roles such as time keeper, summarizer, and reporter.
3. Groups summarize their responses - including the range of agreement and diversity - and report them to the instructor in writing and/or, if useful, to the entire class, orally. Alternately, in a large class, the instructor can sample responses from a few groups.

THE MINUTE PAPER

Please answer each question in 1 or 2 sentences:

1) What was the most useful or meaningful thing you learned during this session?

2) What question(s) remain uppermost in your mind as we end this session?

Reference: Angelo, T. A. & Cross, K. P. Classroom Assessment Techniques: A Handbook for College Teachers, 2nd edition. San Francisco: Jossey-Bass, 1993, pp. 148-153.

COLLABORATIVE LEARNING TECHNIQUE

Jigsaw

This CoLT is particularly effective in helping students master a large body of information that can be divided into discrete, though related, sub-topics. It puts into practice the adage, “To teach is to learn twice.” Variations of the Jigsaw have long been used by medical and law students.

Estimated Time and Effort Required for

Faculty to prepare this CoLT **MEDIUM**

Students to use this CoLT **MEDIUM**

Faculty to assess/follow up **MEDIUM**

Complexity **MEDIUM**

Risk of Failure **MEDIUM**

Duration & Location **30 minutes to several hours/In class or out of class**

Group Size & Structure **Triads to Quintets/Some pre-organizing required**

Description

The name of this CoLT refers to jigsaw puzzles, in which a number of disparate pieces are brought together to form a coherent picture. Students learn best by teaching other students, and in the Jigsaw, each member of a team assumes responsibility for becoming the master and the teacher of one specific part of a topic, issue, or problem. This CoLT can help students learn new subject matter and/or provide opportunities for them to practice solving complex problems. It's particularly useful in courses where students are required to master a large body of information. Jigsaw also creates opportunities for equal participation and achievement; since each student has the chance to be in the spotlight. It requires that students assume responsibility for their learning, gives them double exposure to material, and allows for peer coaching. It also requires positive interdependence, since all members of the group need each other - and need to collaborate effectively - in order to put the pieces together and succeed individually.

Procedure

1. The instructor presents a list of related topics to be learned, making the division of the material into component parts clear. The number of topics should be equal to or a small multiple of the number of students in each group; and usually no more than 3-5 per person.
2. With the proviso that all assigned topics must eventually be learned by all students, learners may be given the option to identify topic preferences.
3. Students work in “expert” groups — with the other students who have selected or been assigned the same topic(s) — to master their common topic(s). They also must determine the best ways to help others learn the material they've mastered.
4. Once the expert groups have mastered their material, the class splits into new groups in which each student serves as the only expert on a specific topic(s). In these new “tutorial” or “study” groups, topic experts take turns teaching the material and leading the discussion.
5. When student groups indicate that they have gained a full knowledge and understanding of the topics covered, the professor holds a full class discussion on all topics or gives an assignment, quiz, or exam to assess their individual and collective learning.

A SAMPLE--GROUPWORK EVALUATION FORM

1. Overall, how effectively did your group work together on this assignment? (circle the appropriate response)

1 2 3 4 5
not at all poorly adequately well extremely well

2. How many of the five group members participated actively most of the time? (circle the appropriate number)

0 1 2 3 4 5

3. How many of you were fully prepared for the groupwork most of the time? (circle the appropriate number)

0 1 2 3 4 5

4. Give one specific example of something you learned from the group that you probably wouldn't have learned on your own.

5. Give one specific example of something the other group members learned from you that they probably wouldn't have learned without you.

6. Suggest one specific, practical change the group could make that would help improve everyone's learning.

Reference: Angelo, T.A. & Cross, K.P. Classroom Assessment Techniques: A Handbook for College Teachers, 2nd edition. San Francisco: Jossey-Bass, 1993, pp. 349-351.

FEEDBACK

Why Give Learners Feedback?

- To improve performance
- To increase motivation to learn
- To promote self-assessment
- To develop independence

Effective Feedback is . . .

- Timely
- Focused
- Forward-looking
- Coherent
- Consequential

To Make Good Use of Feedback, Learners Need MOM —

- Motivation
- Opportunity
- Means

The Order in which We Give Feedback Matters

Consider the Following Sequence:

- 1st - Good News: Strengths
- 2nd - Bad News: Areas for Improvement
- 3rd - What Can Be Done to Improve
- 4th - What the Learner Intends to Do

A FEW KEY REFERENCES--ON GROUPWORK AND COOPERATIVE/ COLLABORATIVE LEARNING

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“LEARNING IS ABOUT MAKING CONNECTIONS”

by K. Patricia Cross

Eight years ago, an article appeared in *Change*, one of higher education’s most influential journals, that attracted a lot of attention from educators. The authors (Barr & Tagg, 1995) called for a dramatic shift in the way colleges view their work. Colleges exist, they said, not to provide instruction, but to produce learning. They use the strong verb “produce” learning in place of what might be more comfortable words, such as provide, support, or encourage learning, in order to make the point “unmistakably” that colleges are responsible for the degree to which students learn. That challenge poses an uncomfortable accountability for many colleges. We have assumed in the past that colleges can do little more than provide instruction; whether students learn or not is up to them. But, like it or not, colleges are now being held accountable for learning, and there is an understandable interest in how to go about “producing” learning.

Fortunately, the demands for accountability are coming at a time when research and scholarship on learning are rich in findings and implications for practice. Stunning new research on the brain by neuroscientists is adding a new dimension to our knowledge about learning, and it is reinforcing rather than changing the tentative conclusions from cognitive science. There is growing evidence that learning is about making connections – whether the connections are established by firing synapses in the brain, the “ah ha” experience of seeing the connection between two formerly isolated concepts, or the satisfaction of seeing the connection between an academic abstraction and a “hands-on” concrete application.

Many colleges are experimenting with learning communities that call for making connections with the ideas and challenges of peers. New programs in service learning and workforce preparation, as well as new approaches to problem-based learning, call for making connections between knowledge and its uses. Interdisciplinary courses, writing across the curriculum, and team teaching call for making connections across the disciplines. The new technologies are connecting people with others and with powerful new sources of knowledge. The common denominator in this current rash of innovations is “making connections,” and that basic concept has strong support in research.

The old image of the classroom with a clear separation — an actual physical dividing line — between the teacher’s podium or desk and row upon row of students aligned to prevent communication with one another, is giving way to small groups of interacting students and teams of students and teachers working together on a common problem.

To what should we attribute this profound change in our conception of learning and how best to produce it? Certainly research— neurological and cognitive — has played a role, as has scholarship in philosophy and epistemology. The growing diversity of the population has required greater flexibility and a certain wariness about the acceptance of culturally-defined “right” answers. And surely dissatisfaction with the results of schooling, combined with the demand for better-educated workers and citizens, has forced those inside and outside the educational establishment to search for change and accountability.

Using the theme, “making connections” as an imperative for learning, I want to talk today about the many ways in which we can help students make connections. For my purposes, knowledge about

the connections of learning can be presented in four broad categories: neurological connections, cognitive connections, social connections, and experiential connections.

Neurological Connections

Let us start with the rich imagery of neuroscientists interested in how the brain works. Children do not come into the world with a brain that is hard-wired like a computer. Rather, throughout life, they “grow” their own brains by constantly making connections in the circuitry of the brain through experience and learning. Research is showing that the circuitry of the brain is wired by neurons that spin out axons that connect with many targets to form the transmission lines that carry electrical impulses. At the end of each wire is a bulb and button unit called a synapse. When an electrical signal reaches the button-like ending, a chemical message crosses the gap in the synapse to connect with the receiving cell. Sensory stimulation strengthens connections, while connections or synapses that are seldom or never used are eliminated. Scientists believe that at birth a baby’s brain contains 100 billion neurons, and that “through a process that resembles Darwinian competition, the brain eliminates connections or synapses, that are seldom or never used.” (Nash, 1997, p. 50). Researchers find that children who are deprived of sensory stimulation develop brains that are 20 to 30 percent smaller than normal for their age (Nash, 1997). Thus, the best advice to parents of newborns is to provide the stimulation that encourages the connections that lay down the pathways for future learning. But, what about the rest of us who work with older students who have brains which, for better or for worse, are already wired for learning?

At the moment, I’m afraid, there is not much more that can be said about neurological development that is helpful to teachers of college students. But one thing that researchers hasten to assure a public grasping, perhaps almost too eagerly, for ways to stimulate the brains of newborns, is that the brain keeps growing and changing throughout life; it is never too late to learn. Indeed, there is some indication that people who continue throughout life to actively stimulate the neural networks of their brains through learning are less likely to develop Alzheimer’s disease than their less engaged peers. The book, *Magic Trees of the Mind*, which describes for the layperson the findings of distinguished neuroanatomist, Marian Diamond, advises that “the brain grows with deliberate stimulation . . . enrich your own experiences and enlarge your cerebral cortex; deprive yourself of stimulation and the brain will shrink from disuse.” (Diamond & Hopson, 1998, p. x). “Use it or lose it” seems quite literally to be true when it comes to making and maintaining the connections in the brain that form the pathways for learning.

Although much remains to be learned about the continuous growth of the brain, new insights into the physical development of the brain so closely parallel the findings of cognitive research that it will be helpful to turn now to what we know about the cognitive processes of learning.

Cognitive Connections

The parallels between the neurological brain and the working mind envisioned by cognitive scientists are quite remarkable. Modern cognitive science postulates a structure of the mind known as the schema — or in plural form, schemata, since the brain develops many schemata for different topics. A schema is a cognitive structure that consists of facts, ideas, and associations organized into a meaningful system of relationships. People have schemata for events, places, procedures, and people, for instance. A person’s schema for a place, such as a college, might include concepts such

as location, reputation, the characteristics of the student population, style of campus architecture, even the location of campus parking lots. Thus, the schema is an organized collection of bits of information that together build the concept of the college for each individual. When someone mentions the college, we “know” what that means, but the image brought to mind may be somewhat different for each individual. As a visitor to your college, my schema is considerably less dense than yours. It contains a sketchy map with gaps and weak links, making it more difficult to locate the connections that build the picture of your community. Similarly, new students coming into this community must build their own picture of the “college” through establishing the connections that become an important part of alumni loyalty.

The schema is a working structure, changing and growing throughout life. Each new event, filtered by perception into the schema, is organized and connected to the existing structure to make meaning. One of Piaget’s remarkable contributions to our understanding of learning is that children’s cognitive structures are not preformed but rather are constructed as a result of their own mental activity. They quite literally “build” their own minds throughout life by actively constructing the mental structures that connect and organize isolated bits of information. Much as we might like to think that we as teachers can “tell” students what we have learned and thus get it into their heads efficiently and accurately, the evidence is that we cannot transfer our knowledge ready-made into the minds of students. Students have to do the actual work of learning by actively making connections and organizing learning into concepts that are meaningful to them. Students remember what they understand — what has made the connections with their own schemata — not necessarily what is said by the teacher.

What students can learn depends, to a larger extent than previously assumed, on what they already know. It is easier to learn something where we already have some background than it is to learn something completely new and unfamiliar. For example, advanced courses in a subject are often easier to teach and to learn than introductory courses. Cognitive theory would explain that paradoxical experience by observing that if the schema is very sparse with respect to a particular subject, connections are hard to find and to make, whereas if the schema already has a dense network of vocabulary, terms, and concepts, it is easier to make the connections that constitute learning.

This fundamental assumption about the role of prior knowledge in learning was tested in a classic experiment that compared novice and expert chess players’ ability to memorize the layout of chess pieces (de Groot, 1966). Chess players of different skill levels were shown the game pieces on a chessboard for a few seconds and then asked to recall the position of the pieces. The novice players were able to place only five or six pieces correctly, but the experts could re-create nearly the whole board. However, when these players were shown the pieces placed randomly on the board (rather than positions from a real game), novices and experts performed about the same. The conclusion from this rather simple experiment is that the superior performance of experienced chess players in recalling chess positions was not due to higher IQs or to better memories, but rather to a schema for chess that enabled experienced players to associate the patterns shown with those already in memory.

The point is that what one knows about a given subject has a substantial impact on the learning process. When teachers complain that students “can’t read,” they refer not only to the lack of reading skills, but to the density of the schema for a particular subject matter. I am a “better reader,” for example, in psychology than in economics because I have a well-developed schema for the terms,

concepts, and even the “ways of thinking” of psychologists.

Much of traditional instruction is based on the old images of the mind as an empty vessel, in which the teacher opens the heads of students and pours in new information which then “adds” to their knowledge. Thus we speak erroneously of students knowing “more” as we add to their storehouse of information. The new cognitive science rejects the notion that real learning occurs when new information simply rests on top of the existing cognitive structure. Alfred North Whitehead (1929) captured the wisdom of active learning in these words: “beware of inert ideas — ideas that are merely received into the mind without being utilized, or tested, or thrown into fresh combinations.” In England, researchers are likely to refer to “deep” and “surface” learning to distinguish between learning that makes the connections that lead to deeper understanding versus information which rests on the surface, inert and unassimilated (Ramsden, 1992).

While there are surely facts that must be learned in any field of study, the problem with surface learning is that when the facts fail to become rooted in the schema, they cannot be used to build knowledge, and the isolated bits of information are quickly forgotten. While some students seem to approach their entire college educations with a surface approach to learning, it is probably an error to speak of surface learners; it is surface learning that is the problem, and all students may use it from time to time. Course conditions that appear to promote surface learning include the following: a heavy workload, an excessive amount of course material, little opportunity to pursue subjects in depth, little choice over topics or methods of study, and an anxiety-provoking assessment system that rewards or tolerates regurgitation of factual information. In short, any conditions that fail to offer sufficient time for incoming information to establish connections with existing knowledge will rest lightly on the surface and be quickly forgotten rather than being absorbed into the schema. In contrast, course conditions that promote deeper approaches to learning include active learning, encouragement of student interest in the subject, opportunities for students to interact with others, and new information presented in a logical, integrated format to establish a well-structured knowledge base (Oxford Centre for Staff Development, 1992).

What these findings seem to boil down to is that deeper learning needs time to work its way into the structure. Students need time to talk, write, reflect, and otherwise engage in activities that help them make the material their own. Teachers face inevitable pressures to “cover” the material, especially in introductory courses, but a study at the University of Michigan showed that students whose psychology instructors omitted details about the nervous system and concentrated on fundamentals had a better grasp of the material than those who had been exposed to the full load (McKeachie, 1994, p. 279). Less is sometimes more!

If we can’t build knowledge structures for students by depositing neatly organized packages into their brains, can we teach them how to build their own minds? Modern theory contends that students can be taught to be strategic learners (Weinstein & Mayer, 1985). Effective learners develop and use both cognitive and metacognitive strategies. Broadly speaking, cognitive strategies concern the what of learning, i.e., taking in and retrieving subject matter content, while metacognition concerns the how of learning, i.e., planning, monitoring, and modifying learning processes. While identifying specific learning strategies is far from a precise science, let me illustrate the concept of learning strategies by describing three cognitive and three metacognitive strategies that have been discussed in the literature.

Cognitive Learning Strategies.

Three basic cognitive strategies that most of us use in academic learning of all sorts are rehearsal, elaboration, and organization (Weinstein & Mayer, 1985). **Rehearsal** strategies are probably more common in school learning than they should be, but we all engage in strategies to help us remember lists, facts, and definitions, — for example, by underlining or highlighting text, by taking verbatim notes, using mnemonic devices, etc. Cognitive psychologists would say that such activities bring the new information into working or short-term memory, but that needs to be supplemented by other strategies in order to organize and integrate the new information into long-term memory or to make the learning one's own.

Elaboration strategies help with this. They consist of paraphrasing, summarizing, creating analogies, self-quizzing and the like. They help learners actively connect the new information with prior knowledge and develop an organizational framework for that subject matter area. Using analogies is an especially powerful elaboration technique because it casts the new learning in a familiar framework. The computer industry caught on quickly to helping people understand word processing by using familiar concepts such as “cut,” “paste,” and “edit.” Because people who had been using typewriters had a well-established schema about how to edit a paper by cutting and pasting, these new computer operations became well understood and easily remembered. Of course, it does little good to explain topic A in terms of topic B if the student does not have a good grasp of topic B. Today's students have little appreciation of the physical acts of cutting and pasting a term paper; thus the words “cut” and “paste” have taken on a different meaning with the proliferation of computers.

Paraphrasing is another elaboration technique that helps students put new learning into their own words. The “Minute Paper” is, by this time, a well-known Classroom Assessment Technique (Angelo & Cross, 1993). The Minute Paper is a Classroom Assessment Technique (CAT) that helps teachers assess what students have learned during a given class period. It consists of asking students to write a brief answer to the question, “What is the most important thing you learned in class today?” The answer to that question is helpful to the teacher in monitoring what she has taught, but it is also a powerful pedagogical tool. When students summarize or paraphrase, they are doing the work of moving surface learning deeper into the schema by making the connections that constitute meaning.

Finally, **organizational** strategies are used to construct connections and develop relationships among ideas. Outlining would be an organizational strategy, as would clustering or any other activity that groups concepts into taxonomic categories that have shared characteristics. Classification into categories is a major learning — and ultimately scholarly — activity in disciplines such as botany, zoology, and biology. Landscapers, for example, organize their knowledge in a wide array of categories and subcategories. Among shade-loving plants, there are annuals, shrubs, ground covers, herbs, and perennials. There are formal, woodland, and Japanese style gardens and fall, spring, hot, and cool colors. Rather than learning numerous isolated “bits” of information, organizing into meaningful clusters helps both memory and understanding.

Although I have described cognitive strategies in linear form, I am not suggesting that learners start with rehearsal and move through a hierarchy to elaboration and then organizational strategies. Most experienced learners have a repertoire of cognitive strategies that are used when and where they help make the connections that constitute the schemata of the mind.

Metacognitive Strategies

Cognitive strategies handle subject matter content; metacognitive strategies handle the process of learning. They are concerned with the how of learning. Metacognition is sometimes referred to as the “executive function” of the mind since it monitors and directs the work of learning. Brown and her colleagues (1983) identify three metacognitive processes: planning, monitoring, and self-regulation. Research suggests that good learners are more effective in their use of such strategies than poor learners.

Planning activities include setting goals for studying, skimming, generating questions before reading the text, and other activities that help the learner activate relevant aspects of prior knowledge to make organizing and comprehending the material easier. Some teachers illustrate a planning activity on the very first day of class by asking students to write out 3 to 5 personal learning goals that they hope to accomplish during the course. Gaining the active involvement of students in articulating personal learning agenda strengthens the connection between their goals and course organization. As a teacher myself, I have found it hard-going to try to get students to plan how they are going to approach their study, but sometimes just showing a scattered learner how he or she might go about being more systematic can help. In our book on Classroom Assessment Techniques, my co-author Tom Angelo and I describe a classroom assessment technique that we call Productive Study-Time Logs, (Angelo & Cross, 1993, CAT # 37, pp. 300-302) It asks students to keep a thumbnail record on how much time they spend studying for a particular class, when they study, and how productively they study at various times of the day or night. Some students gain valuable insights into their own study habits, and discussion and comparison with peers can also give helpful information about the productivity of their own approaches to study. I know for a demonstrated fact, for example, that I cannot read productively while listening to music. I have a hard time believing that the so-called modern phenomenon of “multi-tasking” – i.e. doing several things at once — is as effective as many people claim, but conscious attention to keeping a record might convince me or multi-taskers of what works for us. There is some evidence that talking on a cell phone while driving shows a scrambled brain activity that supports legislation to outlaw the practice.

Monitoring activities are a second form of metacognition. They are broadly concerned with strategies to help students become more aware of their own cognitive processes. Such strategies might consist of self-testing for comprehension, tracking attention during reading or listening, and the like. Most good learners monitor their learning as they work on assignments or study for tests or participate in labs and other classroom activities, but poor learners seem to go through the motions of learning without much insight into the functioning of their own minds.

There are some practical and simple ways to help students monitor their own learning as it is taking place. Teachers might, for example, give occasional brief ungraded quizzes, with the sole intention of informing students how well they understand the subject matter. Or a teacher might conduct a Punctuated Lecture, (CAT #38, pp. 303-306) by stopping a presentation to ask students to reflect on what they were doing during the presentation and how their behavior while listening may have helped or hindered their understanding. Another helpful technique in helping students monitor their learning calls for collaboration with a fellow student. The teacher might end a 20 minute segment of a lecture by asking students to prepare two questions that they should be able to answer from listening to that segment and then to pose their pop quiz to the student sitting

next to them in the lecture. Such very simple techniques help students monitor their learning processes. (Cross, 2003)

Finally, Self-Regulation is related to monitoring. If students are monitoring their comprehension as they read, for example, they can then regulate the speed of their reading to adjust for the difficulty of the material. As experienced learners in our disciplines, for example, we quickly learn to skim materials that are familiar while taking notes, highlighting, or paraphrasing materials that are new or unfamiliar. Self-regulating strategies are assumed to improve learning by helping learners check and correct their behavior as they proceed on a learning task.

So far I have reviewed briefly what we know about the brain's neural connections in learning and about cognition and the need for students to be actively involved in connecting the dots that build knowledge. I turn now to the role of social connections.

Social Connections

We have known for some time that students are powerfully influenced by their fellow students. Alexander Astin's large-scale statistical studies across hundreds of colleges and thousands of students, concluded that the two most powerful factors in student achievement are students' interactions with fellow students and student-faculty interactions. Bill McKeachie and his fellow psychologists at the University of Michigan came to much the same conclusion after reviewing more than 500 research studies pertaining to teaching and learning in college classrooms. In answer to the question, "What is the most effective method of teaching?" the researchers answered, "It depends on the goal, the student, the content, and the teacher, but the next best answer is, 'students teaching other students.'" (McKeachie, 1986)

That advice seems to have been taken to heart in recent years by thousands of teachers. The National Faculty Survey of 1996 showed that between 1989 and 1996, the greatest changes in teaching methods occurred in the shift away from lecturing and traditional classroom discussions toward cooperative learning and group projects – methods that make a special effort to engage students in interactive learning with their peers. Cooperative learning increased by 9% whereas lecturing decreased by 7%. Interestingly, the shift can be accounted for more by younger faculty entering the profession with new ideas about teaching than by older faculty changing their teaching methods. Whereas almost half (46%) of faculty under the age of 35 were using cooperative learning in all or most of their classes, only about a fifth (19%) of those over the age of 65 were doing so, and each decade of advancing age shows a decline in making use of social connections to enhance learning. [Sax, 1996 #291].

The fact that younger faculty are entering the profession using more socially interactive methods offers some assurance that this is not just another passing fad. Moreover, the research on interactive group learning is among the most extensive ever conducted on learning practices, and results are largely positive (Johnson, 1991; Slavin, 1989-90). It makes a huge difference, however, how teachers interpret interactive learning. Karl Smith (1996) one of the major researchers on cooperative learning, counsels against the admittedly attractive notion to overworked faculty that good things will happen if teachers just get out of the way and let students teach one another.

Researchers are in pretty solid agreement about the five elements that are necessary in order to

gain the advantages collaborative learning.

1. **Positive interdependence:** The success of individuals is linked to the success of the group; individuals succeed to the extent that their group succeeds. Sports analogies are useful here. Members of a football team win when individuals excel at their individual tasks. Teachers can enforce positive interdependence by giving both individual and group grades. Teachers, might, for example, give a quiz on last night's homework before the group discusses it, and combine that grade with the grade on an exam after the group discussion.
2. **Promotive interaction:** Students are expected to actively help and support one another. Just as in a football team, the line supports the quarterback, members of learning groups must be required to share resources and support and encourage each other's efforts to learn. Assigning a project that requires students to contribute different components, for example, would require interaction. If the lesson is to determine how authors use biographical events from their own lives to influence their writing, students in a learning group might each be assigned a different author to study. When they come together, they each contribute the results of their special assignment.
3. **Individual and group accountability.** The group is held accountable for achieving its goals. Each member is accountable for contributing his or her fair share; students are assessed individually. There is the inevitable problem of how to grade student learning in group projects. Advocates of collaborative learning would say that grades are given for both the group and for each individual.
4. **Development of teamwork skills:** Students are required to learn academic subject matter (taskwork) and also to learn the interpersonal and small group skills required to function as part of a group (teamwork). Teamwork skills should be taught "just as purposefully and precisely as academic skills." (Smith, 1996, p. 75)
5. **Group processing.** Students should learn to evaluate their group productivity. They need to describe what member actions are helpful and unhelpful, and to make decisions about what to continue or change. Just as students learn subject matter by observing themselves in the action of learning, they learn teamwork by observing their team in action and their role in the work.

Virtually all collaborative learning methods emphasize the importance of promotive interaction and individual accountability. Students must not only learn to work together but must also be held responsible for their teammates' learning as well as their own. Robert Slavin, in particular, has been insistent that successful groups must endorse individual accountability and team rewards. "It is not enough," he says, "to simply tell students to work together; they must have a reason to take one another's achievement seriously." (Slavin, 1996, p. 21.)

There are many techniques for helping students to learn by connecting them actively with their peers in small groups – many of the invented by discipline-oriented faculty searching for ways to make their classrooms and laboratories more socially interactive. I have been collecting some of these techniques, which I call CoLTs, standing for Collaborative Learning Techniques. The techniques range from very simple methods, such as Think-Pair-Share to more complex configurations involving sequential groups or collaboration extending over several class periods.

Think-Pair-Share is just what it sounds like. A simple example is illustrated by a writing instructor who planned to have students write argument essays throughout the semester, so she posed the

following question to the class: What makes a written argument effective? In order to prepare students for thinking about the question, she assigned homework illustrating several different examples of effective argument. Pairing during the next class period expanded individual lists, and full class discussion developed criteria to be used in peer review and in grading student essays.

A variation that might be used in any class is to pose this question early in the semester to orient students to collaborative learning groups. What makes a small group discussion productive? Learning to work constructively with peers is an important learning goal today, and thinking and articulating thoughts about what is productive and what is not is a worthy start to the semester.

Experiential Connections

Finally, the fourth kind of connection that is critical to learning is the most ancient and probably best-accepted form of education — experiential learning. Making the connections between practical experience and academic learning is important in two ways: First, there is the pedagogical use of experience to improve learning; and second is the use of learning to improve performance. In the first instance, we say that “Experience is the best teacher,” implying that one can learn from experience. In the second way of connecting experience and learning, we say that we want an education that is useful — one that will lead to improved performance. It is no surprise that over 70% of this year’s entering freshman said that they decided to go to college to get training for a specific career, to get a better job, and to make more money. *Chronicle of Higher Education*, Jan. 31, 2003, p. A37.

Experience as teacher has a long and fruitful history in education. John Dewey, the father of “experiential learning” and “learning by doing,” has been called “the most important public intellectual of his day,” and a philosopher with unprecedented impact on society and education (Ehrlich, 1996, p. xi). Dewey proposed that learning should be a concrete experience. Students should be faced with the task of solving problems that are real to them.

The influence of Dewey — bolstered by modern research, it might be added — lives on in various attempts to bring experience into the classroom. It is fairly common practice today for teachers to try to make the connections between learning and experience through the use of simulations, gaming, role-playing, problem-based learning, case studies, and other experiential learning techniques that get students involved in something that feels less abstract and more like learning through experience.

It is also fairly common to do it the other way around, starting with formal learning and then connecting it to experience through internships, apprenticeships, cooperative education, service learning, and the like. In both cases, we are recognizing the value of making connections between formal schooling and practical experience, but in both of these efforts the pattern is too often linear. In the first case, the direction starts with experience to enhance formal learning; in the second case, the direction is from formal learning to application.

What we really need for workers and citizens of the 21st century is people who can conduct a continuing lifetime conversation between their own experience and learning — who can use their experience to enhance learning and their learning to enrich application. Employers insist that they

need workers who can think and analyze problems on the job. This is a different skill demand from the old manufacturing format of training workers to apply knowledge gained in school to the job. Today, there are so many different jobs, and they change so rapidly that training for specific jobs has become largely irrelevant. Employers want workers who can think, analyze problems, critique solutions, and perhaps most importantly continue to learn to do their jobs better. That will require the ability to learn from experience, to constantly reflect on what has been learned, to experiment with alternatives, and to evaluate the outcomes. We are discovering that learning occurs, not necessarily as a result of the experience itself, but as a result of reflecting on the experience and testing it against further experience and the experiences of others.

Donald Schön (1983;1987) has written provocatively about the importance of reflection in the practice of professions such as law, architecture, education, and the social services, where the problems are fuzzy and ill-defined. While his work is best known in professional education, his concepts apply equally well to any form of learning that is intended to be applied. In the practice of most careers today, it is not a matter of applying a learned answer to a clearly defined problem, but rather of analyzing the problem and seeking a solution for what is often a non-standard situation. Schön contends that much of the learning that is relevant to practice today is not in books or in academic courses. Practitioners, he says, learn from their practice by reflecting on what they are doing while they are doing it. He calls this “reflection-in-action.” He contends that practitioners construct their own body of knowledge as they go about solving the problems that they meet in their practice. Therefore, teachers he says, should function as coaches, helping students to reflect on what they are doing.

Service-learning is an example of a pedagogical approach that makes explicit the power of reflecting on experience.¹ It is a form of experiential learning in which learning and service are intentionally linked; students address real problems in their communities while deepening their understanding of course content. It differs from volunteer service in that the service performed by the student must be linked to coursework. The hyphen in service-learning is critical,” writes Jacoby (1996, p. 5) “in that it symbolizes the symbiotic relationship between service and learning.” Service to the local community may be a good thing and worthy in its own right, but it is not learning unless students are continuing to construct their own knowledge by reflecting on the experience and connecting it to their classwork.

Experiential learning is a powerful form of learning, We all do it everyday – especially as teachers, we do it everyday. Most teachers would claim that they learn more from a few years of experience in the classroom than they learned in all their courses and textbooks. This is true, however, only to the extent that teachers reflect on how class went that day and have some way of assessing whether students learned what the teacher intended to teach. Teachers are in the best sense of the phrase, lifelong learners.

Conclusion

So what can we conclude about what modern learning theory has to contribute to colleges held accountable for producing learning?

¹ Service-learning also models other learning principles discussed herein. It is problem-oriented rather than discipline-based; it is collaborative and socially interactive; and it promotes reflection and metacognition.

The college that is intent on producing learning will concentrate on helping students make the connections that constitute learning. Cognitive and neural connections are made through establishing and keeping in good repair the pathways that connect new learning to existing knowledge. Social connections are utilized to challenge thought, to engage students actively in questioning and thinking about knowledge that is rooted in the culture and language of our society. Experiential connections are necessary to assure that students conduct an active lifelong conversation between experience and learning.

All of these connections require the active participation and dedication of every member of the college community, working to establish the connections that constitute learning.

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UPCOMING PROGRAMS

(All times are 1:30 - 3:00 PM CT unless indicated otherwise)

APRIL 8, 2004	CYBER INSECURITY? PREVENTION AND PROTECTION SOLUTIONS
APRIL 20, 2004	MAKING MENTORING ACCESSIBLE: INNOVATION AND TECHNOLOGY IN TEACHER INDUCTION
APRIL 21, 2004	TEXAS SUCCESS INITIATIVE
JUNE 2004 (TBA)	DISTANCE LEARNING NURSING RE-ENTRY PROJECT

Programs to be streamed and available via the Internet include:

MARCH 2004	CHANGE YOUR MIND AND CHANGE YOUR LIFE (WELLNESS)
APRIL 2004	CRITICAL THINKING: REQUIRED LEARNING FOR THE 21ST CENTURY
MAY 2004	CHEATING AND PLAGIARISM USING THE INTERNET
JUNE 2004	ETHICAL DECISION MAKING IN THE PROFESSIONAL SETTING --a special three hour in-service program for professional counselors and healthcare providers
JULY 2004	DOES YOUR ONLINE COURSE NEED EXTRA CREDIT TO PASS?
AUG. 2004	RETIREMENT PLANNING FOR EDUCATIONAL EMPLOYEES

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