

## ***Chapter 11***

### ***Making the Transition***

Making the commitment to change from the traditional text-lecture-test format to a cooperative learning format is a decision; making the transition requires action. The decision to make the commitment can be made in a moment, but the transition from professor-centered lecture to student-centered cooperative learning takes time. The commitment to change is the important first step, and *students will begin to benefit as soon as measures are taken to involve them more actively in their own learning.*

#### ***ATTITUDE ADJUSTMENTS***

While making the commitment is based on philosophical and psychological changes, further attitude adjustments will be needed when making the transition. Professors have been professors too long and students have been students too long...the models have been in place for generations...for the transition to be quick and easy. *Will, not wealth...is the key to innovation (Perelman 1992).*

#### ***Deprogramming Professors***

Professors have prepared their lectures, assigned term papers, tested the students, read the term papers, scored the tests, and assigned grades in the traditional classroom setting for so long that the traditional model is the only one most professors have experienced. Professors may be reluctant to stop delivering information by lecture because the students need to hear this “set of lectures” before they will know how

to solve the problems. It is easier for professors to continue delivering information by lecture than to begin thinking of student learning as the main focus. It is not easy to move toward cooperative learning in higher education because *professors traditionally cover the material for the students rather than uncover it with the students.*

Traditional lectures on a college-level subject take up so much class time there is little left over for solving problems with students. If professors try the cooperative approach, however, they may find, as I did, that Fogarty and Bellanca (1992) were right: “...*once teachers begin implementing cooperative interactions, the evidence of student motivation becomes so overwhelmingly visible that teachers are encouraged to try it more.*”

### ***Some Lecture Period Ideas***

Suppose a professor would like to be sure the students know some significant facts or definitions. Giving them a quiz but rather than grading them, having the students compare their answers with those of other students helps them gauge their knowledge level. Discussing correct answers with the class after they have evaluated their own answers insures that all students have the correct answers. This can be a better learning opportunity than giving the traditional quiz and having the students hand them in to be graded.

Suppose a professor has just given a 10-minute lecture on a significant concept. Having students share their understanding of the concept in groups of three students helps them reinforce what they heard, or thought they heard! A summary statement on a 3x5 card might be handed in with the names of the students in the group, providing accountability, an important part of cooperative learning.

Suppose a professor would like the students to review their understanding of a particular calculation. Students can pair up and give each other practice problems and then compare their answers. It is interesting to me that going to the blackboard was great fun in grade school, and I found out that Cornell students enjoyed paired-up exercises at the blackboard too!

The activities described above are three examples that worked well in lecture periods. Many more small group activities can be identified and used even in large lecture halls where students are lined up in rows. Varying the format and timing of such interactions among students makes lecture periods more interesting.

### ***Deprogramming Students***

Some college students like to be told what to do, when to do it, how much to do, and what they need to do to receive an A or a B or to pass the course. Some educators suggest that expectations should be clear and concise. Some professors allocate different fractions of the final grade to different requirements in the course. Students like that approach because they know just what each assignment is worth, and may even try to “beat the system” by allocating different amounts of their effort to different requirements. *This is counter to what learning ought to be about!*

Teachers have assumed responsibility for student learning for so long it is hard for students to assume that responsibility for themselves. When I first started to use the cooperative approach one of the students who did not like the approach said to me “*I am still too much of a student.*”

Cohen (1994) lists the norms for traditional classrooms as: Do your own work, do not ask for or give advice to another student when doing an assignment in class; pay

attention to the teacher; keep your eyes toward the front of the room; be quiet...*it is no wonder that students need to be deprogrammed when they encounter a cooperative learning environment for the first time!*

Hamm and Adams (1992) summarize the attitude changes needed by students in a cooperative learning environment, pointing out that “*getting over years of learned helplessness takes time.*” Students have been conditioned to think that the teacher is there “*...to validate their thinking and direct learning.*” Students have been “*constantly compared with one another for grades and recognition.*” They expect from teachers “*direction on the smallest detail...*” As Hamm and Adams pointed out, and I experienced this too, unlearning these dated learning models takes time. Cooperative learning has become more common in elementary and secondary schools in the last two decades, however, so future college students may be introducing cooperative learning to professors!

### ***Gaining the Confidence of Students***

How can professors gain the confidence of students while deprogramming them? Students should not be told they are being deprogrammed because they will raise their defenses immediately. It is better to *demonstrate the fun and effectiveness of the cooperative learning approach by telling them this class will be “...somewhat different from some other classes you have had.”*

Consider the following premises for gaining the confidence of students:

- *Learning is natural, so let’s demonstrate that.*
- *Cooperation is natural, so let’s work together.*
- *Discovery is natural, so let’s discover things together.*

- *Learning is fun when we feel a sense of accomplishment.*
- *Sharing what we have learned with others is rewarding.*
- *Solving meaningful problems together is satisfying.*

***Focus on student abilities.*** Learning and thinking are natural and fun when we focus on student strengths rather than weaknesses. Providing students with problem-solving situations appropriate for their level of knowledge gives them opportunities to use the abilities they have, *which inspires them to develop their abilities further.*

***Provide support and encouragement.*** Students and teachers all thrive on encouragement. There's no reason to rush into "giving grades" for student work early in a semester when encouragement would be much better. Rather, support their efforts by showing interest in what they are doing and giving them help when it is needed. *Giving low grades early in the semester in order to get the students to work harder is more risky than providing support and encouragement before assigning any grades.*

***Focus on what is right.*** Focusing on what students have done right before pointing out their mistakes encourages students to do better. Helping them improve demonstrates that mistakes are steps rather than barriers to learning. *If students are confronted with their mistakes before they hear anything good about what they have done there is a high potential for barriers to form between student and teacher.*

***Have students improve their own work.*** After first encouraging students and then helping them learn what is not quite right in their work, have the students assume responsibility for improving it. Give them the responsibility for finding the grammatical error they might be making throughout their writing rather than marking every occurrence for them. Give them the responsibility for

checking the answers to their calculations rather than correcting their papers for them. Professors should help students take responsibility for assessing and correcting their work because they will have to assume that responsibility in the future. *Nurture independence, not dependence.*

***Give students responsibility.*** Give students as much responsibility for their own and each other's learning as possible. College students welcome responsibility and they need experience in accepting responsibility and in managing their time. Assignments can be barriers to learning *if they do not give students enough responsibility for defining their own work and for managing their own time.*

***Don't expect to know everything.*** A cooperative learning classroom, where students are responsible for so much of the learning, is like having almost as many laboratory sections as there are students. Professors cannot be expected to know everything when so many different learning activities are taking place. There is no shame associated with not knowing if professors work with students to find answers. *Teachers gain the confidence of their students by learning with them.*

### ***CLASSROOM ADJUSTMENTS***

Making the transition from traditional lecture to cooperative learning in the college classroom can be done in many ways, and there is no single set of steps to follow. It is not easily explained either because so many dynamic processes are involved, "...many of which are so broadly distributed and intangible that they are practically invisible" (Pereleman 1992). The Cooperative Learning Center in Cornell's Department of Natural Resources (Moen et al. 2000) looked like an ordinary laboratory with some computers in it; *what went on there was different.*

### ***Cooperative Learning by Design***

Effective cooperative learning environments are created by teachers who recognize the framework needed in relation to both the students and the material being learned. Professors plan to have groups discuss an idea or concept in a lecture period. Professors plan to use short-term work groups to accomplish specific shared tasks. Professors plan to have long-term productivity groups make significant contributions to the information resources used by students in several related courses. What are some of the main steps in planning a cooperative learning environment? Consider the following:

- *Identify topics of appropriate size and complexity.*
- *Prepare plans and then have students identify the goals.*
- *Identify with the students the knowledge and skills needed to meet the goals.*
- *Implement the plans with everyone in the workgroups participating.*
- *Prepare products that provide tangible evidence of learning.*
- *Evaluate the products, emphasizing self-evaluation by the producers, the students.*
- *Publish the products so others will learn from the work.*

***Identify realistic and meaningful problems.*** Students can work together on realistic and meaningful problems that provide meaningful results for use later. An example from my field...making calculations of energy metabolism and fat mobilization of representative black bears in winter dens is better than making up a set of numbers just to put students

through a calculation. Groups of two to four students can work together on designing the calculations. They must determine how much black bears weigh, the energy content of fat, the body composition of bears in the winter, the metabolic rates of bears in dens, and the number of days black bears spend in their dens. These parameters are necessary for the calculations, but the numbers used by different groups need not be the same. *It is more interesting to represent small and large bears, lower and higher metabolic rates, and different numbers of days in the den and then compare the results than to have all the students use the same numbers to see if they all get the “right” answer.*

***Have a complete framework.*** Follow through on cooperative learning activities from ideas to final products, giving students something to be proud of as tangible evidence of their work. The black bear calculation mentioned above begins with a discussion about how bears depend on their fat reserve in the den; the concept of energy balance (see page 101). This is followed by preparing worksheets with the sequence of calculations, designing computer models, writing supporting text files and publishing the information on the local area network. The final product should be so complete and well written that other students will understand both the concepts and the outcomes after reading the text files and using the computer models. It is not necessary to “teach” this black bear material to new students each year since the published files would be available for students in the future. New students should work on another species or on new problems, adding information resources to the electronic publishing system.

***Model experiments.*** Laboratory periods, which are usually longer than lecture periods, provide many opportunities for cooperative activities beyond the typical



“lab partner” approach. Every group need not work on the same experiment, for example. Different learning groups can work on different experiments and share the results with the class. Small groups can do model experiments that illustrate a particular result that will be useful for all the students later in their own research. A model experiment should include a planning phase, time for learning to use equipment, collecting and analyzing data, and writing a professional-quality report for publication on the information system

***Design problems.*** Design problems are ideal for cooperative learning because students can share ideas and come up with a collective design that has more features than individual designs would have. When groups of students work together on design problems, competition between groups develops naturally too. Students look forward to such competitive challenges and having design contests provides special recognition of winners.

***Risk-taking is okay.*** One of the hardest traditions for students to overcome is the fear of being wrong. Students need opportunities to learn that risk-taking is okay if they learn from their mistakes! As students assume more responsibility for their own learning, being wrong will be a natural part of learning. Students in cooperative learning environments are not matching wits with teachers but are working with their teachers in a community of learners who solve problems together, make mistakes, and learn more while understanding relationships better.

***Guidance needed.*** Guidance by teachers, teaching assistants, and student mentors is needed when students are introduced to a cooperative learning environment where information resources and learning are shared. They will not know what responsibilities are to be met and what roles are

to be assumed at first. They will not assume roles as recorders, encouragers, and reporters unless the roles are explained and practiced in discussion groups. Assuming roles, fulfilling responsibilities, and publishing their work are all meaningful assignments, different from “read pages 80-100 and write a report to turn in next week.”

***Quality control.*** Quality control is essential if student work is to approach professional standards. Rather than have the students turn in their assignments to see how well they have done, the cooperative approach promotes professional quality by mutual help and support. Students and teachers alike strive for quality when planning group meetings, discussing ideas, and when doing the research and writing the reports. Quality reports involve more than good writing. Files may be well written, but if they are based on incomplete literature searches and poorly designed research, they do not meet the professional standards expected when the files are to be shared with others. Teachers have always had high expectations of their best students; *why not design a learning environment where all of the students have high expectations for themselves?*

***Discuss success.*** Cooperative learning environments grow in effectiveness when students benefit from their success as individuals and as groups. It is so much better to focus on what is right than to focus on what is wrong with student work. Discussions of improvements needed are more effective after recognizing the good parts of a student’s work. It is important for students to accept responsibility, not only for their failures but also for their successes, recognizing that the quality of their work depends on them and not on the teacher’s corrections. Students should save drafts and notes recorded during discussions to help them realize that they are held accountable for improvements in their work. They will see the improvement when they

compare early drafts of their writing with the final copy. *When students see tangible evidence of the improvement in the quality of their work they will have more pride in the final product.*

### ***Skills Needed by Professors***

Lecturing is the main skill expected of professors in the traditional college classroom. Shortly before I retired I received an announcement of a workshop on “how to give a better lecture.” While it is true that if professors are going to give a lecture it ought to be a good one, many other skills are needed to be truly effective college teachers. Cooperative learning environments require several new skills—none of them difficult—and some of them are discussed briefly next.

***Personal contact skills.*** Knowing the first names of students may not be considered a skill but it is an important part of a cooperative learning environment. The eye contact professors make with students, how professors respond to student’s ideas, how criticism is given, how students are encouraged...all these personal contacts have major impacts on how students react in a learning environment. Positive professor-student relationships are critical in a cooperative learning environment because professors are models for students. *The success of a cooperative learning environment depends on personal interactions among students and teachers.*

***Listening skills.*** Teachers are such a traditional source of information that it may be hard for them to listen to students. Further, professors have authority over their classrooms and the power to enforce the rules. Professors are responsible for assigning final grades, not the students. *Truly listening to students and making them part of the professors*

*ultimate responsibilities will be a new experience for many college professors.*

***Nurturing learners.*** A critical information mass may be needed before a subject begins to make sense to students. Professors need to nurture their student's understanding by helping them reach that critical mass, exhibiting leadership by sharing from their general knowledge and years of experience. The basic concepts discussed in Chapter 9 can be considered the critical knowledge mass the students should be familiar with. Upon reaching such a critical mass, students begin to "catch on" and *both professors and students move toward every teacher a learner and every learner a teacher as they apply the concepts to new situations.*

***Organization skills.*** Cooperative learning environments require more organization than preparations for traditional lecture courses do. The subject matter, cooperative activities by groups of different sizes, roles of teaching assistants and interactions with students all require organization in cooperative learning environments. They are meaningful components, however, because such organization is much more similar to the workplace than the lecture hall. Having a group of students who believe in the value of a cooperative learning environment makes it fun because learning becomes a cooperative effort among teachers, teaching assistants, and students. *Cooperation extends to all members of cooperative learning environments.*

***Observation skills.*** Cooperative learning requires that teachers and teaching assistants be good observers so they can step in to help students, encourage them, correct them, and redirect them at appropriate times in their group work. Done too often or at the wrong time, students will revert to dependence on the teacher. Done properly at the right time,

students appreciate help that enables individuals and groups to move forward more effectively.

***Encourage self-evaluation.*** Teachers should set the stage for effective self-evaluation. For example, instead of saying to a student author “*The introduction to your paper was good*” we might say “*What is it about the Introduction that makes it so good?*” Asking the latter question encourages self-evaluation while the former does not. *Self-evaluation is a prerequisite to self-correction.*

***Encourage self-correction.*** It is essential that teachers encourage self-correction by students. This places the responsibility for learning on the students, where it belongs. When students are accepted as real people who can do meaningful things in a cooperative setting, they will want to be more responsible for their own learning, for their own time management, and even for their classmate’s learning. *Patience will be necessary as mistakes are observed, but that’s expected when working with people in any setting.*

***Conflict resolution.*** While the phrase “cooperative learning” infers the presence of cooperation and the absence of conflict, more opportunities for conflict are created in a cooperative learning environment than in the traditional learning environment. This is not unlike life in general, however. *Learning how to resolve conflicts is one of the most important learning experiences students can have in a cooperative learning environment.*

### ***Skills Needed by Students***

Students need to acquire many new skills when they assume more responsibility for their own learning. The professor’s role shifts from spending many hours of time preparing lectures to spending much of the time helping students learn

how to accept that responsibility. Some specific skills are introduced below.

***Finding relevant resources.*** Students need to learn how to use the electronic tools effectively when finding relevant information resources on-line and in libraries. Not everything that has been published is listed in electronic card catalogs so they may have to combine manual searches with electronic searches. They also need to be reminded that not every bit of information available is valuable. *Students need to know how to find and evaluate the quality of information resources.*

***Thinking skills.*** Fact seeking and data collecting are lower-order thinking skills; solving problems is a higher-order thinking skill. Students should learn to recognize relevant factual data, evaluate the data, and how to use data in problem solving. *Students should learn both the “how to” and the “why” in cooperative learning environments.*

***Sharing information.*** Sharing information is a natural human activity, but many of the skills needed to share effectively must be learned. In traditional learning environments, where teachers are central and students work alone most of the time, students have few opportunities to practice these skills. How to find facts efficiently, how to share facts appropriately, how to express and share opinions respectfully, how to prepare plans and publications together...*all of these sharing skills are important in cooperative learning environments.*

***Managing resources.*** Students have few opportunities to manage their own time in traditional classrooms because they are usually told what to do. They might think of themselves as “good” students because they wait for the teacher to give the instructions and then they follow them. The question I heard most often from students when they were first introduced to cooperative learning was “*What do*

*you want me to do?”* Helping students learn how to manage the two resources that we all have to work with in any subject—information and time—is one of the most important outcomes of a cooperative learning environment. As students get better at managing these resources, they learn more about the subjects they are studying, and *they are being prepared for life-long learning.*

***Decision Making skills.*** Students have many opportunities to practice decision-making skills in a cooperative learning environment because so many group decisions must be made. Some of the decisions pertain to the subject matter and some to social interactions. Students should learn about and practice different ways in which decisions can be made because there will be many opportunities to practice these skills in a cooperative learning environment. *Students who acquire these skills in cooperative learning environments are often frustrated in traditional courses where the professor assumes responsibility for all of the decisions.*

### ***Social Skills Needed by Both Teachers and Students***

All of the skills listed separately above under teachers and both teachers and students are common to both groups. Being polite to others, sharing ideas and listening to others, accepting group decisions gracefully and saying “thank you” are some common social skills that are an integral part of cooperative learning environments. It is easy to assume that both teachers and students have these skills, but do they?

***Saying “thank you.”*** Sure, we know how to say “*thank you,*” but do teachers know *when* to say thank you to students? Do we thank them publicly for contributing an important idea to a group discussion? Do we thank them privately for showing understanding in a group discussion?

Do we thank groups for their final reports? *Hearing a sincere “thank you” from their teacher is always an encouragement to students.*

**Accepting group decisions.** This may seem like a student-skill rather than a teacher-skill, but what does the professor do if a group of students makes a decision that is quite different from the expected, and maybe even less desirable? Unless there is an element of danger involved, the professor may have to accept the decision and let the students learn from the experience...and that can be hard to do gracefully. *But if professors expect their students to accept group decisions gracefully, then professors should too.*

**Listening and sharing.** It is sometimes hard to be a good listener. Both students and teachers are inclined to interrupt when someone else is sharing an idea or expressing an opinion. I had a telephone conversation recently with another professor who, as soon as he thought he had an idea of what I was going to say, began responding to my anticipated ideas. It was frustrating because I could not finish expressing myself, and his anticipation was not always correct. Learning to give courteous attention to speakers, listening patiently, planning responses well...cooperative learning gives both teachers and students many opportunities to practice these listening and sharing skills. *Being a better listener results in a higher level of consciousness and courtesy by everyone involved.*

**Being polite to others.** Who isn't? Well, sometimes professors aren't, and get by with it because of their position of authority. They don't have to say *“I am sorry I do not have time”* because they can get by with saying *“I don't have time.”* However it is said, it is a model for students, and the first of these two phrases is a better model than the second one. A cooperative learning environment provides



students with many opportunities to be polite. The students were more polite to each other than I expected them to be in the cooperative learning environment; perhaps this was because I had so few opportunities to observe such politeness in the traditional learning environment. *Teachers and students have many opportunities be polite to others in a cooperative learning environment.*

***Conflict resolution.*** Conflict resolution is a skill needed by both professors and students. Any time two or more people work together there is potential for conflict. It can be avoided by making one person the absolute authority and making all others submit, but that model is not appropriate in the classroom or in today's society. When cooperative learning is practiced in higher education, professors need to be prepared for the conflicts that might arise and how they might be resolved. *Conflict resolution is an integral part of the learning experience in a cooperative learning environment.*

### ***Useful Models***

Since teachers cannot create cooperative learning environments by exerting power and authority or by giving specific directions to their students, many aspects of cooperative learning involve modeling by the teacher. Cooperative learning is itself a model, as is writing to publish what we have learned for others to learn from. Computer models that demonstrate relationships between variables are useful models; students may be inspired to do similar creative work when they learn that another student has written the model. *These and many other models are more powerful models than teachers may realize.*

***Cooperative learning as a model.*** Cooperative learning, where teachers are learners along with their students, is an

excellent model for students. As professors demonstrate a desire to learn more, students feel that they should do the same. Professors are models when they listen to students, work with them, respect their ideas, praise them for their good work, and learn along with the students. One of my students told me that small group discussions in which one of the students had been designated an “encourager” caused all of the students to be more encouraging to others in group work. *The level of awareness was greater than if it had been only a verbal suggestion because it had been modeled.*

**Writing models.** One of the most effective modeling activities professors can use in a cooperative learning environment is writing. They can write and publish in an electronic information system on a local area network in order to deliver information to their students. Many professors publish in professional journals, and writing good text files to be published with the student files serves as an excellent model for the students. The traditional term papers students write can be converted to files formatted for electronic publication, making them available for other students to read. The quality of these publications will have a great impact on the quality of the work of new students; it is hard to imagine a new group of students choosing to do lower quality work than the students before them! *Writing examples set by both teachers and students are effective models that will stimulate further writing because students want to do good work and have it used by others.*

**Computer models as models.** As more students acquire computer-programming skills, more creative computer models can be written and used by others. The day will never come when we can purchase software to do everything we want to do so students should learn to program (Boomer and Moen 1996, Runge and Moen 1996). Supporting computer models with text files, worksheets, images,

videos...all components of electronic publishing...contribute to an understanding of relationships that would otherwise be abstractions or verbal models only. *Computer models are not just mathematical calculators; they are symbolic processors that stimulate creative thinking in any subject on many different kinds of problems.*

### **ARBITRARY ASSESSMENT**

What are traditional examinations? Attempts to see what students know or do not know? Are professors trying to validate the amount of knowledge their students have or the knowledge itself? It is traditional to give exams periodically throughout each semester and a final at the end. Further, courses are usually evaluated by students at the end of a semester. Such timing is arbitrary, and Perelman (1992) points out that it is “...as obsolete as inspecting products for defects at the end of the assembly line.”

What professors try to learn about their students by giving exams does not always represent what students have learned. Students know that, and are quick to point out questions that are vague and ambiguous, and material that they knew that was not in the exam, *i.e.* they studied the wrong thing. Students are quick to argue over interpretations and the number of points given on essay questions. Could it be that traditional examinations, limited to a certain number of pages and questions and a set amount of time, are more arbitrary than authentic?

Students are asked to reveal what they know by responding to what the teacher asks on a traditional examination. The evaluation is controlled by the teacher, and may or may not be relevant to “real life” expectations of knowledge. Students try to match wits with the teacher, guessing what will be on a test and taking their chances.

Missing the mark for whatever reason gives students opportunities for complaint and self-pity, which they are more than happy to share with other students who have similar excuses for doing poorly.

What would happen if the situation was reversed and professors were examined by students? Professors would likely feel uncomfortable about that. We would prefer to discuss the subject matter with our students, interacting with them by sharing our thoughts. We would feel that by doing so the *students would have a much better idea of what we know and how we think than if they gave us an “exam.”* Is it not likely that the same is true when professors evaluate students? Let us consider some ideas about authentic assessment rather than arbitrary assessment.

### ***AUTHENTIC ASSESSMENT***

It is traditional to have students complete assignments individually and take tests as individuals. Some professors have their students work together but require *individual* reports from each of them. Why? Perhaps because, as Perelman (1992) says, *“The role of collaboration...in learning is placed in the category of cheating.”*

Even though test writing, scoring and grading is not as enjoyable as lecturing for most professors, one of the last powers professors are willing to give up is the responsibility for assessing student work. While professors are ultimately responsible for assessing student work, there are many ways for students to assume some of the responsibility, without considering it to be cheating. It is not only desirable but also natural for students to assume that responsibility in a cooperative learning environment.

Authentic assessment is based on meaningful experiences. Investing part of one's life in something, as

students do in a cooperative learning environment, makes learning more meaningful. Sharing ones knowledge and understanding with others makes learning more meaningful. *Professors owe authentic assessment to their students.*

### ***Learning Group Assessments***

Learning groups need to learn how to assess their own productivity as a whole, and students benefit from developing personal and group evaluation skills. When students assume responsibility as a group for doing their work, they also assume responsibility for the quality of their work as individuals. *Students gain confidence in their ability not only to learn but also to evaluate the value of their work when they assume that responsibility.*

***Assessing group progress.*** Group progress needs to be and can be assessed when tangible products are expected from group work. Progress in relation to time from start to finish, the amount of time taken for different activities within a project, the status of group products such as publications for a course information system...these all can be and should be assessed by the group before being assessed by the professor. This places the primary responsibility for assessing productivity on the group of individuals responsible for the work rather than on the professor.

***Who corrects what?*** Teachers are often reluctant to have students “correct” their own papers. Why? Suppose students are asked to complete some calculations on a take-home worksheet. Since there is no control over the source of the answers when they can work on the problems on their own, there is no point in having the teacher or a teaching assistant grade the worksheets. Asking the students to “treat it like a test” does not guarantee purity. Rather than spend hours of time outside of class correcting such worksheets for

the students, a few minutes of common time in class gives every student the correct answers and opportunities to discuss questions they might have. Telling students that the worksheet will be graded, and the grade is worth a stated fraction of their final grade, is not the learning incentive that should be promoted. Rather, worksheet and other *assignments should be prepared in such a way that learning more about the concepts and calculations is the motivation for completing the work rather than a grade.* Working in groups and assessment by groups makes such evaluation activities more efficient.

### ***Authentic Assessment is Easier***

While cooperative learning requires some adjustments in the way student work is evaluated, it is actually easier to make meaningful evaluations of student work in a cooperative setting than in the traditional one (Moen et al. 1998). Professors have more contact with students in a cooperative learning environment than in a traditional lecture setting. Each contact with a student in a cooperative learning environment is an opportunity to learn about their attitude, their knowledge and their skills. Professors also have formal evidence of their student's work in cooperative learning environments because both students and professor can evaluate real products—participation, presentations and publications—as they happen. Such authentic real-time assessment is better than end-of-the-semester assessment is, whether arbitrary or authentic. Brief descriptions of some examples of authentic assessments are given next.

### *A Course Continuum*

- *Library, laboratory and field research by students provides professors with opportunities for meaningful discovery, discussion and evaluation of results.*
- *Published work by students provides professors with opportunities for professional-level editing of student writing.*
- *Information systems provide students with opportunities for professional-like publishing and professors with opportunities to evaluate student productivity.*
- *File folders maintained by each student provide a tangible record of progress and products of students, much like the personnel files of professionals.*
- *Performance reviews provide valuable authentic assessment similar to career evaluations, and students benefit greatly from this more personal evaluation.*

While peer evaluations can be an integral part of a cooperative learning environment, students should not be responsible for assigning grades to their peers. Teaching assistants can be helpful in determining the order of students in relation to each other for different aspects of a course but professors have the ultimate responsibility for calibrating and assigning course grades.

### **CONCLUDING REMARKS**

Making the transition from the traditional text-lecture-test teaching method to a cooperative learning environment involves many changes in both attitude and approach. Rather than thinking of it as a move into an unknown area of nebulous learning, think of it as a move toward creating a

*A Course Continuum*

professional-like environment (Moen et al. 2000). Students are the career professionals, and they work together to produce information resources of value to others. The generic product is information, the functional products are knowledge and understanding, and the practical products are technical skills and problem-solving abilities. *Once the transition to cooperative learning is made, teaching and learning blend together and every day can be rewarding for both teachers and students.*