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Using Cooperative Structures to Promote Deep Learning

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The author explores concrete ways to help students learn more and have fun doing it while they support each other's learning. The article specifically shows the relationships between cooperative learning and deep learning. Readers will become familiar with the tenets of cooperative learning and its power to enhance learning—even more so when it is carefully structured and sequenced to promote deep learning. Concrete examples also offer some practical applications.

Faculty developers and others who specialize in research on teaching and learning recognize that much of the research is convergent. Positive teaching and learning practices do not operate in stand-alone vacuums. A savvy university teacher draws eclectically from a number of sources and resources to design coherent teaching and learning plans. This article will examine symbiotically how cooperative learning and deep learning together can promote greater success both in and out of the classroom.

Tenets of Cooperative Learning

The tenets of cooperative learning are well known. I share seven aspects of the research with faculty members when I am working with them to promote better teaching results.

Structure

First of all, I emphasize the value of *structure* in using cooperative learning. If group work can be viewed on a structure-based continuum, then at the highly structured end lie cooperative learning, problem-based

learning (http://www.udel.edu/inst/), team-based learning (http://www.teambasedlearning.org/), and process-oriented guided inquiry learning (POGIL) (http://www.pogil.org/). People also ask me about the difference between cooperative learning and collaborative learning. The key difference is that cooperative learning is well defined, but collaborative learning can mean almost anything depending on who defines it. It can be fairly tightly structured, or it can be totally "loosey-goosey," such as the collaborative learning I experienced as a student in the 1960s: an unprepared faculty member would urge us to "get in a group and groove" while he disappeared down the hall. There were no objectives, no explicit instructions, no time limits, no projected outcomes—everything was left to chance. The term "yadda yadda" had not been invented yet, but that was what occurred. I *HATED* it.

In contrast, the activities in cooperative learning are often called *structures*, reinforcing the tightly controlled oversight.

Problem Solving

Second, I emphasize the focus on *problem solving* in cooperative learning. Virtually all disciplines have key issues needing exploration, if not resolution. Thus, cooperative learning is an extremely useful pedagogy. It is not necessarily focused on consensus-based conclusions to these problems. Open-ended summaries of the various stances are viable options. Some critics of cooperative learning see it as task-oriented rather than problem-oriented, but this view is far too narrow.

Heterogeneity

The third aspect of cooperative learning is a personal one that is not replicated in the literature. I am passionately committed to *heterogeneity*. Hence, I create teams that are as a diverse as possible. Diversity is critically important, because students need to develop critical-thinking skills, which come from having assumptions challenged and seeing alternative ways of approaching problem solving. Furthermore, diverse teams ensure that students will learn to work with others unlike themselves, important workforce skills. Therefore, I do not allow students to self-select their own team members, because they typically pick people who look and think like themselves, hence shutting down opportunities for critical thinking and thwarting the diversity they will encounter in jobs where they don't choose co-workers. I select the teams based on data sheets that students complete during the first day of class. I predetermine the criteria useful

for each team based on the nature of my course. For example, in my evening adult education course on children's literature, I make certain that each team contains an English major who can peer-coach and explain the vocabulary and the necessary skills for a close literary analysis. Then I distribute the male students, who are in short supply in an evening course on this topic. Finally, I try to put in each team students who have children, knowing that they will provide "reality checks" to the discussions: "You say you LOVED *The Phantom Tollbooth*? Well, my 12-year-old hated it." Obviously, these criteria will be irrelevant for other instructors' courses in other disciplines.

Positive Interdependence and Individual Accountability

The next two aspects of cooperative learning are "givens" in the research literature. They, in fact, help define the nature of cooperative learning, distinguishing it from other, less-structured versions of group work. They are *positive interdependence* and *individual accountability.*

Positive interdependence means that teachers give students a vested reason to work together. The nature of the problem/task should require more than one student participant. I typically use the nature of the task to result in teamwork. For example, a roundtable activity uses only one piece of paper per team, requiring everyone to add ideas to it. Thus, the task cannot be completed without cooperation.

Individual accountability is more complex: It basically means that students earn the grades they receive. Too often in other less structured forms of group work, faculty members put students in teams, assign a task, and then "rubber stamp" the final project. Thus, if a team of four completes a research paper, the instructor would not take into account the fact that one student may have pulled most of it together with some minor help from two of the students and zero involvement from the fourth team member. The instructor assigns a group grade of "B" that all four students receive, regardless of their individual contributions.

Cooperative learning definitely does *not* take this approach. Instead, the instructor conscientiously and deliberately determines the contributions of each team member and assigns grades according. Typically, instructors ask for two review sheets from each team member: (1) an individual self-assessment delineating what he or she contributed to the final product and (2) peer reviews of the other team members clearly delineating that they did and didn't do. I also add a third assessment, an overall evaluation of the team's achievements, roadblocks, and issues. Before assigning grades to students, I review all of these documents.

If the students' assessment sheets do not adequately demonstrate each student's individual accountability, then I meet with the team to discuss the involvement of the various members.

Group Processing

Group projects are not a "given" with cooperative learning. In fact, they are often difficult to monitor and assess. When I was first using cooperative learning with adult learners scattered all over a geographic area, I never assigned out-of-class group work. My cooperative activities were all completed in class, usually without any specific points. If students complained about not receiving any credit, I would point out that Professor X down the hall uses a lecture approach in his classes: "Does Professor X assign points to students based on their attentiveness during his lecture? Does he take up notebooks and assess the quality of the students' notes? No? Well, lecture is the 'business-as-usual' in his class. In our class, it is cooperative group work." No student has ever rebutted this argument. As reflected in the cooperative learning literature, monitoring of the teams is essential. Both the instructor and the students must pay attention to what goes on in the teams. This oversight is sometimes referred to as *group processing*.

Social or Leadership Skills

Finally, in cooperative learning all experts agree that *social or leadership skills* are crucial. These skills must sometimes be taught, but are always monitored by both teachers and students. These skills include such things as drawing out reluctant speakers, shutting down the dominators, and being certain that all team members contribute. Some instructors actually teach mini-sessions on these skills to be certain that students are adept at them. Cooperative learning instructors do not assume that students come to their courses with the prerequisite skills for working in groups.

Deep Versus Surface Learning

The tenets of *deep learning* are far less well known than the tenets of cooperative learning. The term has become almost a "buzz word" in higher education that is often bandied about without any attempts to define it. As early as 1995 James Rhem wrote a paper that laid out four principles in the international research on deep learning: (1) motivational context, (2) active learning, (3) student-student interaction, and (4) deep foundational knowledge based on concepts. Rhem contrasts deep learning with *surface learning* based on research conducted initially by Marton and Saljo (1976),

who found that students prepare for tests by using two different methods of learning material. Surface learners study the material superficially and uncritically, searching for facts—often unconnected and unquestioned—that they can commit to memory. Not surprisingly, students who study this way rarely retain the material or understand its genuine meanings.

In contrast, students known as deep learners read for both comprehension and understanding, seeking to integrate conceptual ideas. These learners connect the new knowledge with relevant prior knowledge. Deep learning approaches allow students to retain material over time and to readily retrieve and apply it. Their approaches result in long-term retention of the learned material coupled with retrieval strategies.

I summarize the two approaches—deep and surface learning—in Figure 1, which draws from a variety of sources: Atherton (2009), Bailey (2011), Caine and Caine (1991), Langer (1997), Millis (2011), Ramsden (1992), Tagg (2003), and Weigel (2002).

The Fusion of Cooperative Learning and Deep Learning

It is remarkable how the two theories—cooperative learning and deep learning—fuse, signifying "best practices." When researchers examine the four principles of deep learning, it becomes evident that the active learning and the student-student interactions can easily be referencing cooperative learning practices. Thus, faculty can assign motivating pre-class assignments to get students into the knowledge base (the two other principles), but instead of taking the out-of-class work and thrusting it into a briefcase for later grading (my former practice), the pre-class assignments are actively *used* during the same class period they are submitted through cooperative learning approaches.

Three examples will clearly illustrate these approaches. All of them rely on graphic organizers—instructional tools, such as Venn diagrams, that indicate relationships—to focus the pre-class assignments.

Example 1: Double Entry Journals

Students read an article or summarize a presentation given by a guest lecturer completing a double entry journal (DEJ). With a DEJ, a common practice in the writing-across-the-curriculum literature, students summarize the author's key points on the left side of the journal entry and opposite the point made by the author or guest lecturer, they write a personal response. Students can relate the key point to their own lives, to material they have learned in other courses, or to mate-

Figure 1
Deep vs. Surface Learning

Deep Learning	*Surface Learning*
Learners focus on "what is signified," seeking meaning. They are constantly checking their progress, relating evidence to conclusions as they reason logically and critically.	Learners focus on the "signs," failing to invest in a critical examination of key principles. They do not distinguish between principles and examples.
Learners relate previous knowledge and experience to new knowledge and ideas. They draw on information and ideas learned in previous courses.	Learners do not tap previous knowledge and experience. They fail to relate and integrate new material.
Learners actively engage with the material, viewing information and ideas from multiple perspectives.	Learners are relatively passive, viewing information from a single, simplistic perspective.
Learners are mindful. They approach material with the deliberate intention of mastering it.	Learners do not pay attention to what they are reading or doing. They look for the easiest answers, relying on old ideas, however inappropriate.
Learners look for patterns and underlying structures that enable them to organize content holistically.	Learners view material as isolated, memorizing random facts and applying "plug and chug" formulas as a way to make sense of new material.
Learners are intrinsically motivated.	Learners are influenced by external factors, particularly perceived testing practices.
Learners relate to learning and enjoy it.	Learners dislike learning and consider assigned tasks as hurdles to be leapt before undertaking examinations.

rial they have studied in their current course. The point of doing the entry is reflection. Personal reflections are motivating because students relate the material to their own experiences/lives and to their own previous

knowledge. Double entry journals should be clearly defined and carefully limited, perhaps to 2 pages or to 10 key points, so that the overachievers in class don't exhaust themselves and the instructor.

I typically mark DEJs, making appropriate comments, but I do not assign a letter grade to them. Instead, I give pass-fail points as credit, say, 10 points for a satisfactory DEJ and 0 points for an unsatisfactory one. The pass-fail option allows me to stop agonizing over those difficult decisions as to whether a submission deserves an A- or a B+. The decisions for pass-fail are relatively easy to make, and students rarely dispute such grades because they know they did not do significant work if they get a "0."

Example 2: Character Traits Graphic Organizer

In the second example, students complete as a pre-class assignment a graphic organizer focused on the key traits of an assigned character. The students are in groups of three, four, or five, depending on the number of main characters. As an example, I will use Shakespeare's Hamlet, which has four main characters: Hamlet, Laertes, Claudius, and Gertrude. Each group member in teams of four is assigned a different character. They identify for their character four key traits and then provide the textual evidence supporting these choices. A completed graphic organizer might look like the example in Figure 2.

When students come to class, they build on their out-of-class work using an approach called Jigsaw. The students form expert teams for each character, drawing on the representative from each team who worked on the given character If there are six teams composed of four students in a class, then each character is represented by the six class members who prepared their graphic organizer on it. Thus, teams 1-6 would form an expert team composed of six students who created graphic organizers based on Hamlet. Another expert team would be composed of the six students who focused on Laertes. If a class has more than six teams, then more than one expert group can be formed. To avoid confusion in large classes, the instructor can post large signs on the walls above the meeting area for each expert team, for example, Hamlet, Teams 1-6; Hamlet, Teams 7-12; Laertes, Teams 1-6; Laertes, Teams 7-12. Clear instructions are essential with cooperative activities.

Students bring a blank graphic organizer to their expert group. While in the group, they compare graphic organizers, selecting the best four traits and the best evidence to support those traits. They then complete a new—and better—graphic organizer. The original teams reassemble, and each student in turn "teaches" the other three about his or her character.

Figure 2
Character Traits Graphic Organizer

Character: Hamlet
Author: Barbara Millis

Trait One: Indecisive	*Trait Two: Impulsive*	*Trait Three: Conflicted*	*Trait Four: Vengeful*
Can't make up his mind about his father	Attacks Ophelia verbally	Troubled by his father's death	Seeks to avenge his father's death at the hands of Claudius
Doesn't know whether to believe the ghost's story or not	Suddenly stabs Polonius	Horrified that his mother has married his uncle Claudius after the death of his father	Fights Laertes
			Turns the kingdom of Denmark over to Fortinbras

The original graphic organizer completed by students out-of-class receives pass-fail points counting toward the final grade. No additional points are given for the graphic organizers created in the expert groups.

Example 3: Pro-Con Caveat Grid

The third example uses a graphic organizer called a Pro-Con-Caveat Grid to guide students' out-of-class assignments. The instructor poses an open-ended question and students respond to it by writing all the reasons to be in favor of the statement (the pros), all the reasons to be against the statement (the cons), and all the things to keep in mind while debating the issues (the caveats). Figure 3 is an example. Students in groups of four compare their Pro-Con Caveat Grids and take the best ideas from each to form a new, more complex grid reflecting the most persuasive pros and cons and the most helpful caveats. After teams have completed the new graphic organizer, it is passed to another team, where the students dis-

Figure 3
Pro-Con Caveat Grid

Proposal: Faculty should use structured group work (cooperative learning) approaches in their classes.

Pros	*Cons*	*Caveats*
Students benefit from active learning.	Group work takes up time during class.	Group work must be carefully structured.
Small groups help build community in the classroom.	Some groups could be dysfunctional.	Instructors need to monitor what goes on during group work.
Peer coaching takes place in groups.		

cuss key points such as these: (1) How are these points similar/dissimilar from those we selected? (2) What did we disagree with? (3) What did we discover that was new and interesting? (4) What did we find surprising?

After the teams have discussed the Pro-Con-Caveat grids they received, the instructor calls for volunteers to summarize points made during the discussion. This activity results in critical thinking, because students see alternative ways of responding to the same proposal. During the initial group activity when students are selecting the best Pros, cons and Caveats, they are working at the highest levels of Bloom's Taxonomy (1956): They are making judgments about the value of each pro, con, caveat, and they are synthesizing the ideas from all team members to create a new

Conclusion

In conclusion, as should be evident, there is no one best way to teach. However, the most savvy teachers bring various tools to their teaching, exhibiting an eclectic approach that synthesizes different pedagogies base on sound research. Few pedagogies mesh better than the research on cooperative learning and deep learning.

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