Course Design and Development Ideas that Work

SPECIAL REPORT: COURSE DESIGN

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A Course Redesign that Contributed to Student Success

Maryellen Weimer, PhD

Required introductory courses, especially those in math and science, offer special teaching challenges. Frequently, these are courses that must be completed before students can proceed to their chosen majors. Many of today's college students struggle with these courses.

A recent article in *Change* describes an algebra course like this offered at the University of Missouri-St. Louis. In 2002, the success rate in this course (C- or above) stood at 55 percent. Three years later, 75 percent of the students were succeeding in the course without any diminution of course standards, as measured by performance on a final exam that contained the same types of problems.

Instructors attribute the change to a thorough redesign of the course. They went from three 50-minute lectures a week to one lecture plus two computer lab sessions. In the lab students used a software program to complete homework assignments. Students had to find the information needed to solve the problems on their own. The software (provided by the textbook publisher) aided them with explanations, tutorials, practice problems, and guided solutions. Students could complete the assigned homework at home or in the lab. They could use the lab anytime the facility was open, but during the two scheduled sessions, the instructor and graduate assistants were present to help students. Computers in the lab were arranged in circular pods, which encouraged interaction among students.

This course redesign changed the roles of the instructors and teaching assistants significantly. "They used to spend their time lecturing, writing assignments and exams, and grading. Now they focus on guiding students through the course via the weekly meeting in the lecture room and then working with students individually in the learning center. The greater emphasis on individual instruction and one-onon interactions with students is a change that most instructors find very rewarding." (p. 46-47)

Although the example described here is specific to one discipline, the authors propose six guidelines that they believe contribute to success in any introductory course that students find difficult.

Principle 1: Provide a structure for the course that guides students in their active learning. It doesn't matter what the course, students are responsible for doing the learning. "The instructors are there to provide structure and guidance to help them learn. The lecture session provides an anchor and structure for the course that helps the students focus on the task they need to complete that week." (p.47)

Principle 2: Provide sufficient time on task and enforce deadlines. When students aren't interested or lack motivation, they need a schedule that keeps them on task. In this example that was provided by using the technology to open and close access to assignments, the tutorials and problems could still be accessed by

students after they were closed, but students lost points if assignments were not completed on time.

Principle 3: Reward students for their efforts. The new course design lets students retry a homework problem as many times as they like. Instructors have found that when given that option, many students will work as long as it takes to get the right answer, and the right answer counts no matter how many tries it took to solve the problem correctly. Homework scores equaled 1/8 of the final grade in the course. Students quickly discovered that in this course they could improve their grades by working harder.

Principle 4: Provide regular assessment of progress. The online homework and quizzes offered students immediate feedback. The software also keeps an online grade book that students can access at any time. This was not a course where students had to wonder what they're getting. They knew.

Principle 5: Accommodate diverse styles. Some students do work better on their own. In this course they were not required to come to lab. Most students taking the course did benefit from resources provided in the learning center, especially the presence of the instructor and teaching assistants during the regularly scheduled sessions. Still, it is important to be flexible and provide opportunities for students who prefer to work independently.

Principle 6: Stay in touch. Often, students who aren't particularly interested in a course prefer to remain unknown. Unfortunately, that ends up hurting most of them. With this course design, the technology allowed instructors to keep track of students. If an assignment was missed, a quick message noting its absence and including an offer of help was sent out. "The personal attention of the instructor often provides all the motivation a student needs to complete the assignments." (p. 48)

The authors note that this redesign process was not easy. Both faculty and students resisted the changes. It cost money to reconfigure the learning center. They point out the need for administrative support at all levels. But results like the ones generated by this course redesign are very convincing. "Ironically, one of the prices we pay for the success of our students has been a decline in overall enrollment in college algebra, attributable to the fact that many students now take the course only once. This is a loss of income we welcome." (p. 49)

Reference: Thiel, T., Peterman, S., and Brown, M. (2008). Assessing the crisis in college mathematics: Designing courses for student success. Change (July-August), 44-49.

The Placement of Those Steppingstones

Joe Ben Hoyle

Your students are truly working but they are all struggling. What do you do now?

In Richmond, Virginia, where I live, there is a public park that holds a lovely Japanese garden. It includes a pond stocked with huge koi. By using a series of steppingstones, visitors can walk across the water to the other bank. Over the course of many years, I have observed scores of people successfully ford that pond one stone at a time.

Proper placement of the steppingstones requires a bit of special care. Set them too far apart and some of the shorter children might not be able to jump safely from one to the next. Conversely, if the steps are too close together, then individuals with long legs could find the walk awkward and unnecessarily slow. Of course, if the stones are just randomly thrown into the water, they might not actually lead anywhere.

Watching visitors walk across that pond always makes me think about the educational process that teachers orchestrate for their students. In my classes, most learning appears to be sequential. People speak and write one word and one sentence at a time. Consequently, students seem to absorb information step-by-step. Situations do arise where learning is probably nonlinear, such as developing an appreciation for a Picasso painting, but such cases appear to be exceptions. In a textbook, a lecture, or a study session, the normal learning sequence is as follows: comprehend point 1, then point 2, and so on until the student (it is hoped) arrives at a full understanding.

One of my theories is that education stumbles when either the learning points are not sequenced in a clearly logical order or they are not placed at a proper distance from each other. When troubles arise, look at the placement of those stepping-stones.

If the sequencing is wrong, the teacher may be discussing point five before point two. That almost inevitably leads to confusion. Try an experiment when preparing for a class. Start by randomly listing all the points to be covered. Then, decide which logically comes first, second, and so on to create the order that is easiest to comprehend.

Setting the proper distance between those learning points is a more complex issue. Over the years, some of my best students have been able to leap with ease from virtually any point to the next. Other (equally bright) students needed the steppingstones to be pushed close together, practically touching. Both groups are able to learn the material, and that is the goal. The first uses long strides from one point to the next; the other arrives at the same understanding with a great many short steps covering points placed side by side.

If a class is working hard but having problems, check the sequencing of the coverage. Do the steps form a pattern that is logical for students? Look to see whether the learning points might be too close or too far apart. If students have trouble learning, it can mean that they are not able to make the leap from one point to the next. If students are bored, these points could be too close together so that they are not being adequately challenged.

Editor's note: This essay is part of a collection of essays, Tips and Thoughts on Improving the Teaching Process in College—A Personal Diary, by the author. The entire collection is available for free online at http://oncampus.richmond.edu/~jhoyle.

Understanding Different Types of Group Learning

Claire Howell Major, PhD

Small group learning is learning expressly designed for and carried out in pairs or a small, interactive group. Why should we use small group learning in the college setting? Small group learning provides a practical rationale. Most of us have seen the surveys of employers who are looking for a specific set of skills in their new employees, among these are teamwork, emotional intelligence, global citizenship, communication, and leadership. These are the kind of skills that small group learning can give students practice with and help them develop in.

There's also a very strong pedagogical rationale for using small group learning. My colleagues and I looked at these reasons in this body of research in the book that we wrote together. And it suggests that learning outcomes are improved in courses that use small group learning when compared to more traditional, stand and deliver courses.

The kinds of learning that increase are both content knowledge and the development of higher order skills, such as critical thinking and problem-solving. And students who participate in small group classes are more likely to improve these skills at a higher rate than the students in a traditional counterpart session.

In their grand synthesis of their research on how college affects students, Pascarella and Terenzini have noted that retention and persistence are improved in courses that use collaborative learning and collaborative learning in other forms of small group learning. And the idea behind this is that students make social connections in academic courses that help them. And they want to stay in those classes because they have an obligation to come to class to see their fellow students.

I don't know about you, but sometimes my students groan when I say, "Get in your group and work."

Student satisfaction is improved in collaborative courses or small group learning courses over traditional ones. And that may be something of a surprise, because I don't know about you, but sometimes my students groan when I say, "get in your group and work." But the research is pretty clear that students who participate in small group activities value their learning in these courses more than they do in traditional courses. They appreciate the opportunity to apply knowledge in new ways. There's also increased comfort with diversity in courses where students participate in small group learning. And this makes sense, because they have the opportunity to work with

people who are not exactly like them, too.

If you look in the literature, the terminology is really a confusing mess. Some people use the term "cooperative learning." Some people use the term "collaborative learning." Some people use "peer teaching." Some use "peer learning" or "peer inquiry." There is a range of terms to describe this thing that we call group work. And some people use the terms almost interchangeably or completely interchangeably.

Types of group learning

Some instructors insist there is a big distinction between the different approaches. And some people's distinctions disagree with each other. It can really be quite confusing when you look at the literature. We're going to talk about three specific kinds—cooperative learning, collaborative learning, and peer teaching and learning. I tend to see these as different but related and overlapping approaches.

These three types of group learning share some things in common with each other. For example, they all involve putting students in small working groups. But they have some distinct differences that make them different instructional methods. Let's start with cooperative learning.

> *"The goal is to create knowledge. It involves people making meaning together in a process that is intended to enrich and enlarge them both."*

Cooperative learning is students working together in a group small enough that everyone can participate on a collective task that has been clearly assigned. So they are working together. That's a key part of the definition. They're supposed to do the same thing or the same task and it is a teacher-assigned task. The goals of cooperative learning are to accomplish the task together.

The work must be done together. They must all contribute to the overall project. And they all learn the appropriate content. And they do learn it together, and the goal is that they all learn it deeply and well and about the same degree of learning. For it to be cooperative learning as opposed to some of the other forms of group work, they must engage in positive interdependence.

And that's the notion, that the group must think or swim together. They will be successful or not based on the group's work. And they're tied to each other. But there's also individual accountability. And in my work with students, that's been the key thing, making sure that they all must demonstrate that they have done work independently to contribute to the group.

There has to be promotive interaction. So they have to help each other and they have to support each other. There has to be teamwork skills. And this is an area that not all students come to higher education with already. They have to learn those skills and develop them. And there has to be group processing. So they have to think through what they did well and what they could improve on for next time.

An example of a cooperative learning technique is the "think pair share." Most people know this one, but it's great. It's a really good one. I've used it in almost every class I've ever taught. The first step is giving students a question and asking them to think for a minute about their responses individually. Then you ask students to turn to a neighbor and share their responses with each other. It could be to convince each other of their responses, or to come up with a collective response. But the idea is that they are talking about their responses to each other. And then the last step is sharing the information with either a slightly larger group

than the pair—maybe two pairs pair up—or with the full class so that they all get the same kind of information from the activity.

Collaborative learning asks students and faculty to work together to create knowledge. It's breaking down traditional structures of authority and control in the classroom. And the goal is to create knowledge. It involves people making meaning together in a process that is intended to enrich and enlarge them both.

The key goal is that they're creating knowledge and they're creating it together. But it's not all the same knowledge and it doesn't have to be equally distributed. For collaborative learning to be collaborative learning, there must be a shift in authority and control in the classroom. So couple of examples of collaborative learning techniques are the group co-authored paper and peer editing.

Peer teaching can be likened to a tutoring situation. The goal of peer teaching is to help students learn critical content. So in peer teaching, students must take on the teaching role themselves. A couple of examples of reciprocal peer teaching techniques—one of them tends more toward cooperative learning and the other leans little bit more, in my opinion, toward collaborative learning.

The first is a jigsaw, when students form base groups and they study some content very carefully in their base groups and they try to learn it well enough to teach it to the other students in the class who are not in the base group. Then students are redistributed into new groups, with one member coming from each of the first base groups. So you have four or five expert members in the new group who are teaching the rest of the students the original content. They are learning the same content, they're learning it together, and they're learning it in similar ways.

Another example is microteaching. And I use this a lot in my college teaching class, where students take turns actually teaching the class. So they will have maybe a 5 or 10 or 15 minute time span that they can elect to teach, in my case, a particular instructional method to the rest of the class.

Choosing a group teaching method

How do you choose a specific form of group work or group activity? And I think this is a really—on the surface—an easy question. Make sure your learning goals are this and that the method's goals align with that so you get where you think you're going.

When we look at the different methods, knowing about them and then knowing what they are and how they play out, what they're intended for, and where you're going can be very helpful in that. But at the end of the day, there is a whole lot of inspiration involved in choosing the methods. We need to choose the method that's going to accomplish the learning goals that we want, and we must be intentional about the group learning method that we choose and make sure that it's accomplishing a goal. Group work for group work's sake is never a good idea.

Adapted from *Choosing and Using Group Activities in the College Classroom*, a Magna Online Seminar.

A Brain-Friendly Environment for Learning

Davie Davis

Thanks to new technologies of brain imaging and major breakthroughs in cognitive research, neuroscientists now know more about the functioning of the human brain than ever. This new knowledge should help us revolutionize our teaching methods, but what about those of us who can't tell a hippocampus from a hippopotamus?

As an English professor whose gray matter has frequently proved more or less impervious to scientific discourse, I decided to tackle this challenge head-on, so to speak. Here are some of my findings, along with their implications for teaching and learning.

1. What we always suspected has been confirmed by research: students really are incapable of "paying attention" in class—at least for extended periods of time. We now know that the upper limit of the human brain's capacity to pay focused attention to a lecture is about 20 minutes. After that, students' brains are wandering, reflecting, consolidating, and resting. We may as well accommodate this tendency by alternating lecture with other modes of learning, such as questioning, talking, and writing, in order to allow students to review and assimilate what they've just learned.

2. The most effective learning is based on prior knowledge. Each neuron in the brain contains treelike structures called dendrites. With the acquisition of new knowledge, neurotransmitters fire across the synapses between neurons, resulting in the branching of new dendrites from old, forming an ever-widening network of learned information. Just as we wouldn't expect to see a tree suddenly materialize in the sky, with no visible connections to the earth, we shouldn't expect our students' brains to form strong new dendrites with no links to existing ones. Here's one of my own strategies for building on prior knowledge. As the American nuclear family continues to morph into a multiplicity of subforms, most students have become familiar with the resultant proliferation of stepparents and the conflicting loyalties generated by their presence. I let the class discuss these family issues before reading Hamlet.

3. Thought and feeling are inseparable brain processes. Traditional Western pedagogy

encourages students to approach their studies from a purely objective, rational perspective, with their feelings temporarily checked at the classroom door. However, researchers have found that the functions of cognition and emotion are so intertwined in the brain as to be indistinguishable from each other. In fact, a portion of the brain's emotion system called the hippocampus is in charge of transferring information into memory. This means that information associated with values and feelings will be more readily learned. So even in science disciplines students should be encouraged to develop passionate stances on issues such as cold fusion or stem cell research so that they will retain information more efficiently.

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4. Perceived dangers cause the brain to downshift to its most rudimentary processing mode and bring learning to a halt. A substantial body of research indicates that negative emotions such as stress and fear cause the brain to be flooded with cortisol, a chemical that seriously impedes the ability of the hippocampus to retain new or call up old information. In addition, both stress and fear cause the brain to abandon the complex thought processes of the neocortex and revert to the reflexive behaviors of the limbic system and the reptilian complex, both of which date back to an early stage in the brain's evolution. These phenomena account for the student who is so overcome with test anxiety that she literally "can't think." They also explain why the student who is fearful of the teacher, the subject, or both often takes refuge in primitive slouching and glaring behaviors. Teachers can mitigate some of these effects by using multiple assessments rather than two or three major tests and/or by creating less-threatening learning scenarios, such as small groups or talking partners.

5. The search for meaning is innate. The old analogy of the human brain as computer has been rendered inadequate by new research; likewise, the left brain/right brain model has largely outlived its usefulness. We now know that unlike the computer, the human brain constantly seeks meaning and pattern in a rich milieu of emotions, facts, associations, memories, and other inputs; moreover, the brain constantly traverses between its two hemispheres in an attempt to reconcile and synthesize information from both realms. We can create a brain-antagonistic environment by presenting isolated, random, one-dimensional information, or we can capitalize on the brain's hunger for meaning by providing information in relevant contexts that yield both intuitive and logical meaning. For example, in the Colorado School of Mines' undergraduate engineering program, students apply ideas from Descartes and Shakespeare to engineering problems, complete openended design projects, investigate relationships between engineering and social issues, and engage in a continual search for connections between engineering and other aspects of human life.

The above is by no means an exhaustive inventory of the findings of 21st-century brain research. However, for me, these principles have provided a good start toward understanding how to provide a brain-friendly environment for my students and myself.

A Large Course with a Small Course Option

Maryellen Weimer, PhD

At a skills conference for teaching assistants, sponsored by the Institute for Teaching, Learning & Academic Leadership at the University at Albany (a research university within the SUNY system), Erica Hunter, a graduate student in sociology, did a presentation in which she shared an innovative course design whereby she creates a small class within a much larger one.

Hunter developed the model based on some sanguine observations about students taking a 300-level special topics in culture course. Many are in the course to fulfill a requirement. They don't plan on being sociologists and have, at best, a fleeting interest in the field. But some in the class are interested; they may find the content intriguing, be inherently curious, or have a commitment to learning in every course. Hunter wanted to provide those students with a rich classroom experience, but how could she do that in a course enrolling 123 students, of which a significant portion did not find the course content particularly motivating?

Hunter responded by designing two different options for the course. In one, students attend lectures and take four exams, each worth 25 percent of their grade. In the second option, students also take the four exams plus they complete a set of eight writing assignments responding to reading and discussion topics. The writing assignments account for 20 percent of their grade, which makes each exam worth 20 percent of their grade. It's a good option for anxious or not very good test takers. Hunter had students select one of these options at the beginning of the course. About 30 selected the writing option. After the 40-minute lecture, students may leave or stay for a 30-minute student-led discussion focused on the course readings. On average, about 20 to 30 students stay for discussion. Students in both course options are welcome to join the discussion.

Pick one or two practices to implement tomorrow, and you'll be on the road to a more sustainable work-life balance.

The beauty of the model is that students who participate in the discussion have chosen to be there. Hunter reports that they are more likely to come prepared, having done the reading and ready to contribute to the discussion.

"There isn't a lot of 'sitting and staring' waiting for someone to break the silence," she reports. Even though she takes a back seat during these discussions (contributing only when issues need clarification), both she and the students get to know each other, creating a bit more community in an otherwise large, not terribly personal,

learning environment.

Besides benefiting students, the model works well for teachers, in this case a busy graduate student. The discussion can spark interesting insights about course content that can then be shared with the larger class. Time spent with a smaller group of students provides valuable feedback on their understanding of the course content as well as their perceptions about and responses to the material. Finally, it controls the amount of time the teacher is spending grading writing assignments.

Yes, all students would benefit from writing in the course, but it's not realistic to expect an instructor to grade that much writing. However, this model gives all students the opportunity to select a version of the course that includes writing. It's a design that lets students make decisions about the quality of experience they want in the course and at the same time allows the instructor to deal with the realities of large course instruction. Kudos to a graduate student for coming up with such a clever design: it's a large course that can be taken in a smaller package.

A Blog, a Physics Course, and a Change in Student Attitudes

Maryellen Weimer, PhD

Does it matter if students leave courses with a positive attitude toward the content area? Maybe successful acquisition of content is all that really matters. Maybe teachers don't need to be concerned if students "liked" the content.

As physics professors Duda and Garrett (reference below) point out, this is about more than whether or not students "liked," in their case, physics. The positive attitudes toward the discipline that teachers need to cultivate "encompass an appreciation of how physicists think and operate; the value of physics as it applies to other fields, such as engineering, biology, and medicine; and the applicability of physics to everyday life." (p. 1054)

Regrettably, students don't always leave introductory science courses with positive attitudes. In fact, Duda and Garrett cite a number of studies showing that students actually leave physics courses with more negative attitudes than they brought with them to the course. That should be of concern for all sorts of reasons, but most compelling, as Duda and Garrett note, "if we care about learning, we need to pay attention to students' attitudes." (p. 1055)

Duda and Garrett decided to try to impact student attitudes in an introductory physics course by incorporating a blog into the course. The blog was designed as an extra credit assignment (although later in the research it became a required part of the course). The instructor posted several blog entries per week and students received two points for reading and posting a thoughtful response. ("Very cool" was not considered a thoughtful response.) If students blogged regularly, they could raise their overall grade in the course by 2.5 percent. The content of the blog mirrored content being covered in class, but it addressed real-world problems and issues.

So. when electrostatics was being covered, there was a blog entry about the physics of lightning.

In fact, the blog linked to a YouTube video of a car being struck by lightning. To test the impact of the blog experience on attitudes toward physics, the researchers used an instrument developed by others and used in previous research. They compared pre- and post-class attitudes of students in the courses with the blog to those of students in control sections with no blog.

"We found that students who did not participate in the blog generally exhibited a deterioration in attitudes towards physics as seen previously. Students who read, commented, and were involved with the blog maintained their initially positive attitudes towards physics." (p. 1054) Students in the sections where the blog was used were surveyed about the blog specifically, and their reactions were "overwhelmingly positive," even in sections where the blog became a required assignment.

In addition to the impact on attitudes, the researchers note that having to read the blog and post comments forced the students to do more reading and to learn about physics topics that were not covered in class. They also repeatedly had students who never participated in class interacting regularly on the blog.

The article discusses how much time was involved in preparing the blogs and identifies resources that were helpful in doing so. Obviously, once a collection of posts has been developed, the posts can be reused, and if they need to be updated, that can be accomplished with a modest time investment. Given the very positive outcomes, the time required seems well worth the investment.

Reference: Duda, G. and Garrett, K. (2008). Blogging in the physics classroom: A research-based approach to shaping students' attitudes toward physics. American Journal of Physics, 76 (11), 1054-1065.

A Critique of Scaffolding

Larry D. Spence, PhD

So, what does that mean—"I need to provide more scaffolding?" a superlative teacher asked with frustration in his voice. He was just back from a peer review debrief. "Maybe that's more a suggestion than a criticism," I offered. "Okay, but what do I do to provide more scaffolding?" he asked.

In the age of Google, answers are only a click away. Soon I was poking through a confusing array of 234,000 options.

During the last 30 years, scaffolding has at one time or another referred to any and all teaching activities: modeling, assessing, questioning, monitoring, and prompting as well as baby talk, software, textbooks, problems, analogies, and plain old encouraging words.

Scaffolding can be provided by parents, siblings, mentors, peers, instructors, and communities. It can refer to physical objects like computers and calculators or cultural objects like language and tradition. It is a noun referring to material and symbolic structures. It is a verb referring to transient actions. Meaning anything that might help someone learn, the term seems to be another way of gassing up the folkways of teaching so that they sound profound. Researchers use it to discuss what teachers do when focused on learners. Acclaimed as "one of the most

recommended, versatile, and powerful instructional techniques," it supposedly prompts teachers to get out of the way.

So, what did the peer reviewer mean when he told my colleague to "provide more scaffolding"? Probably the reviewer thinks my colleague's students need more help. What kind of help? The help that helps them learn. How much more? As much help as helps them learn more. With this language, experts (and peer reviewers) can say something erudite about any classroom practice without offering much in the way of help. Can we do any better?

Sometimes good metaphors further understanding. Such figures of speech can help us see familiar aspects in something new or see something familiar in a new light. The scaffolding metaphor doesn't do either. It functions more like a crock of oatmeal (to use a metaphor) covering and congealing what instructors do. Not finding any help there, let's try considering scaffolding as an object. How does it function? Some authors write as if it holds up buildings under construction. Others more correctly note that it is a transient structure that supports workers who lay bricks, erect beams, nail siding, or paint window frames.

So how might scaffolding as an object relate to teaching? It can refer to efforts to prop up a learner or to create a situation in which a learner can do something. Accordingly, instruction can prevent failure or enable learning. Either teaching is a set of protective activities that eliminate mistakes and reduce frustration, or it is what an instructor designs to allow learners to perform beyond their normal capacity.

In our hearts we would like our teaching to do both. But the point of teaching cannot be to eliminate or even reduce the likelihood of failure. To eliminate failure throttles the learner. For the student does the learning. The student must be free to think and act and, in so doing, err—and recover. That is the cost of learning. To prescribe that teachers enable learning is a tautology. Of course that is what we want to do—the question we beg is: "How?"

If scaffolding is to help answer that question, it should illuminate the differences between what the teacher does and what the student does. It should get us to think about the instructor as a planner and initiator of activities that invite students to develop their own goals and strategies.

"As we know, learning grows out of the students' previous knowledge and skills. But the assignment must challenge without being so difficult as to discourage learning or so easy as to evade it."

As we know, learning grows out of the students' previous knowledge and skills. But the assignment must challenge without being so difficult as to discourage learning or so easy as to evade it. Both student and instructor have to be active. Importantly, the instructor's actions cannot replace or suppress the students' actions. The teacher's role is more collaborative—shoulder to shoulder not higher reaching down or at the side propping up.

How do you help without promoting helplessness? How do you challenge without promoting defeat? How do you induce learning by doing without scarring those who cannot do?

These questions need research and discussion that take a fresh perspective and vocabulary that helps us name the crucial activities. What we don't need are more names for our ignorance that don't clarify our practice.

Are there any good metaphors out there to help us describe, discuss, and conduct research on these issues? More likely they are to be found in other learning situations. To start, here are

two: the training wheels we put on bicycles to enable youngsters to learn balance and the tee-ball pedestal that allows six-year-olds to play baseball. Each device works by restricting and focusing the teacher's role while expanding the learner's opportunities. Both offer new and more fruitful ways of looking at learning designs and teaching practices. Both allow us to escape the scaffolding that now prevents further construction of understanding.

Maximizing Engagement in the Flipped Classroom

John Orlando, PhD

The flipped classroom (or "blended learning") has become a hot topic in education over the past few years. The concept makes perfect sense. Traditional courses are set up to "push" content out to students during the face-to-face meeting, and then have them apply that content to assignments done outside of class.

But the student who is having problems on an assignment does not have the instructor there to ask for help. The flipped classroom solves that problem by moving the content phase to outside of class, and the application phase to inside of class. The advent of easy video production and hosting means that there is no longer a reason for students to be at some place at some time to view a lecture. The lecture can be recorded and put online for them to view on their own. This frees up class time for materials that generate engagement with the content.

But many instructors have had a hard time finding activities that truly engage the students in class. Often, they fall into the "lecturing and clicking" mentality of pushing content, but with periodic polls or surveys. While these activities are better than nothing, they are often not truly engaging. Look at the screens of your students' laptops during class, and you will most likely learn that much of their attention is devoted to other websites, email, or texting. This has led even faculty as forward-thinking and tech-savvy as Clay Shirky to forbid electronic devices from his courses.

But Ronald Yaros, associate professor of journalism at the University of Maryland-College Park, has found both a technique and a technology to keep students' attention and maximize engagement in the flipped classroom. He first notes that laptops quickly produce "what Linda Stone calls 'continuous partial attention' between a presentation and their laptop. When

given the option to either look at slides or view websites on a laptop, limited digital self-regulation quickly makes the laptop a distraction."

However, laptops are not the only option for in-class devices. Yaros has his students bring tablets to class. He then uses an app called "Nearpod" to host the class content and interactivity. Nearpod allows instructors to post a variety of different types of content on the app for students to view from their own tablets, from slides to websites, videos, and the like. It also provides a number of means to gather feedback and engage students, including polls, surveys, and discussion.

Here, Yaros adds a twist. Instead of projecting his slides on a screen at the front of the room, which allows the class to have some other content on their own devices, he only projects the content to Nearpod. He runs whatever content he wants to use on his own tablet using Nearpod, which the students watch on their tablet. Thus, "students no longer have the option to 'multitask,' or switch between projected slides and their laptops, which could lead to distraction. Now, if students aren't engaging and interacting with class content on their mobile device, they'll miss key concepts, explanations, class discussions, and my questions about the content that they produced."

Yaros goes on to say, "I use the Nearpod app to share the presentation via WiFi. The Nearpod app is free to students, without the need for creating an online account. I easily convert my slides for display in Nearpod, and conduct real-time polls (good-bye clickers), as well as ask open-ended questions for text responses that I can share anonymously on everyone's device. We can also view live Twitter feeds and PDF documents that I share with the class."

Yaros also sweetens the pot by having students use some of the outside-of-class time to generate inside-of-class content. Instead of just recording and posting traditional lectures for students to watch outside of class, he makes use of Twitter and Blogger to have the students create content that will be discussed in class. As he says, "At the beginning of the semester, I distribute a semester long schedule of five rotating teams for each chapter in the course. From day one, every student knows the team they are on during any given week and the deadline for posting content.

Yaros also sweetens the pot by having students use some of the outside-of-class time to generate inside-of-class content.

After I introduce the chapter and summarize the key concepts, every student is expected to research, produce, and post their own course related content before our next class meeting."

"The team assignments that detail specific content to post are announced that week. For example, students assigned to the rotating Twitter team research and post course-related tweets, which are displayed for all to read on our course blog. A second team posts 150 words on the course blog, explaining their research of the chapter's topic. To manage my grading time, only students in a third team research, produce, and post comprehensive multimedia content for their own ePortfolio, which is listed on the right-hand column of the course blog. This means that I'm reading and grading the longest postings from only a small portion of the class. Students in a fourth team post summaries of the assigned readings, and the final team must review the postings of their peers to provide constructive feedback. All students use the time between classes to produce and post their content, which

will be synthesized and discussed for the second component in my blended course, our face-to-face meetings."

"The results and the student feedback have been amazing. My two-week experiment last fall compared the same content, taught by the same teacher (me), in the same room and on the same days, to two sections of 60 undergraduates. One section used the Nearpod app on a tablet or phone. The other section viewed the traditional projected PowerPoint slides with no devices. Quiz results suggested no statistically significant differences between Nearpod and the traditional sections, but students' ratings of course enjoyment and relevance were significantly higher in the Nearpod section. It is important to note that most of the research to date reported that laptops reduce attention and learning, compared to classes without laptops. My results suggest that it's not the technology per se, but the type of devices used and how that technology is supported. In this case, devices did not reduce learning and increased enjoyment of the class."

Yaros goes on to say, "Even classes that are totally online could use Nearpod, because students can download interactive presentations as homework, progress through it at their own pace, and even take quizzes. Similar to the synchronous sessions, quiz results are automatically reported back to the professor from the field when the student's device connects to WiFi. And if you upgrade the app, students have the option to take notes on their device as they view the presentation in or out of class. Their own notes can be emailed back to them after viewing."

If you have dipped your toes into the flipped classroom waters, consider how Nearpod and the techniques Yaros describe can generate engagement in your course.

The Truly Participatory Seminar

Sarah M. Leupen, PhD. and Edward H. Burtt, Jr., PhD

In typical upper-division seminars, each week, one student leads 10 to 15 classmates in a discussion of an important research paper in the field or presents his or her own work to the group. Students not presenting are supposed to participate in the discussion but rarely do, despite professorial queries aimed at generating a lively, provocative exchange. Seminars using this format can be deadly dull. We decided to tackle the problem and would like to share our ideas for more interactive, exciting, and educationally enriched exchanges in seminars.

The most important change we made was to have every student present every week in one of three formats: one minute (approximately seven students per week), five minutes (three to four students per week), or 15 minutes (two students per week). In one minute, students present an idea or introduce an organism (we teach biology) that illustrates the topic of the week. Time for questions following the one-minute presentation is unlimited. In five minutes, students are expected to present a more detailed, literature-based perspective on the topic with, again, unlimited time for questions.

The 15-minute category is closest to the

"traditional" paper presentation on a designated topic. One week before presentation, each presenter must provide a copy of the paper or post it on the seminar website for the rest of the class and faculty. After the paper is available, every student in the seminar must post one or more open-ended questions about the paper on the seminar website at least 48 hours before the class meets. The student presenter is expected to address these questions in the presentation. After the 15-minute presentation, there is unlimited time for questions raised in the seminar.

Inevitably, and delightfully, we find that the whole is greater than the sum of its parts. Without any puppet-string pulling by us, biological themes emerge from each seminar meeting. These flesh out the week's topic and unite the individual presentations.

We enforce time limits stringently, using a bell to warn students when they approach the limit. When the time is up, one of us begins to ring the bell furiously, thereby drowning all conversation. As soon as the student stops, we proceed to questions. We make the bell ringing something of a show, thereby adding enough levity to relax the atmosphere and provide a bit of amusement. Nonetheless, the bell does effectively end the presentation.

The format ensures that all students come prepared and that all participate in the presentations and join in the discussions that follow. We use the number of questions each student asks during the seminar as an additional measure of participation and remind students that the quality of their questions is also a factor.

The effect of having every student present every week is that every student is truly present every week—interested, engaged, with a "stake" in the proceedings.

Finally, instead of writing a paper read only by the instructor, each student prepares a poster for presentation at a general session on the last evening of the seminar. During the first hour of the seminar, half the students stand with their posters while the instructors and half the students wander about listening to each presentation and asking questions. During the second hour, the students switch roles and we repeat the process.

Throughout the semester we emphasize participation by having students post preliminary questions to a seminar website, by having students present something at every meeting of the seminar, and by having all students prepare a poster for public display and open discussion. The result is a lively seminar in which most students ask questions, pose ideas, and actively discuss controversial issues. The effect of having every student present every week is that every student is truly present every week—interested, engaged, with a "stake" in the proceedings. We and our students learn a great deal in these seminars and find that far from dozing through another long and boring paper, our evenings are filled with the excitement of exploring new material, debating important ideas, and finishing ahead of the bell!

When to Begin the End: The Role and Use of Summary in Course Design

Barbara Mezeske

How do you approach the final weeks of your course? Most of us include some sort of summation activity: a final review, a course evaluation, sometimes a reflective paper.

Recently, I have begun to incorporate these kinds of activities much earlier in my courses, with good results for learning and for those final teaching evaluations.

Here's an example of what I've been doing: About halfway through my literature course, I come to class and ask the students to generate a list of all the things they think I will include in my discussion of the day's assignment. If we are reading, for example, Tolstoy's The Death of Ivan Ilych, I would expect students to list things like the significance of the title, the use of irony, symbols like Ivan's Respice Finem medallion, the importance of minor characters, the relationship between Ivan and his wife, Christian symbolism, and the reference to light in the ending. Students work in small groups, and I give them about 10 minutes to come up with their lists. Then, as a class, we put the lists on the board, talking about each element of the story as we go. They never disappoint me. Their lists mirror my own, and sometimes expand my thinking in interesting ways.

> *"An activity like this conveys the idea that all courses ought to change us in some way..."*

At the end, I congratulate them on becoming informed readers of literature. I remind them that the lasting value of any literature course is to prepare them to read effectively and intelligently on their own, for the rest of their lives.

I use an activity like this to remind students of the goals of the course (to learn to read carefully and insightfully) and to assure them that they are achieving those goals.

Here's another in-course summary activity I use: Partway through the course, I ask students to list the concepts that they have learned, or that have been reinforced, or that have been challenged so far in the course. This can begin as an individual activity that directly leads to group discussion. I also like to ask individuals to write two or three concepts in these categories, then I collect and collate them anonymously. The next class session, we spend 10 or 15 minutes assessing how the course has affected their learning. We can compare their responses to the goals and objectives listed in the syllabus and see (hopefully) some congruence. An activity like this conveys the idea that all courses ought to change us in some way, either by deepening existing knowledge, introducing new perspectives, or challenging us to examine preconceptions.

In still another midterm summation, I challenge students to think about their own activity in the course so far. Sometime during the third or fourth week of the semester, I ask them to report the average number of hours they are spending per week on the course, including reading, writing, and studying. I collect their estimates (anonymously) and report them on a spreadsheet. (This could also be done immediately in class with personal response technology.) When we look at the results, we talk about the idea I call "value in, value out": increased effort at a task generally yields better results. I invite students to compare their own amount of effort to the average. If they are spending lots of time with little result, I meet with them individually to try to sort out the problem. On the other hand, if they see that their effort falls on the low end of the class average, this can help them see why they are learning less and not doing as well as they would like.

My goal here is to remind students that the real responsibility of learning new material is theirs, not the professor's, and that by investing time they increase the worth of any class experience.

The value of reflective and summative activities before the final days of a class derives from the way these activities encourage students to look at the big picture, to assess learning in meaningful ways, and to take ownership of their own learning. Doing these activities early in the semester increases satisfaction with the learning experience. That satisfaction shows up on our end-of-semester teaching evaluations, which ask students to comment on how well their professors helped them to do these very things.

In-Class Writing: A Technique That Promotes Learning and Diagnoses Misconceptions

William S. Altman, PhD

Instructors need to gauge students' comprehension and to discover what misconceptions they internalize as they learn. Unfortunately, the discovery of what students don't understand emerges later, when we give examinations. By then it's often difficult to remedy those incorrect ideas or approaches. I would like to share how I've adapted a technique so that it addresses this problem and accrues other benefits.

I begin each class with a quotation, musical excerpt, or short video clip germane to the day's topic and give the students a minute or two to write about it. This engages their attention and prompts them to think about the subject before our discussion begins. I begin my presentation by asking students to share some of what they've written, and then I use their remarks to scaffold to the more complex concepts I want to cover.

At the end of class I give the students another two minutes to reflect on and summarize their understanding of the material and to record their sense of how it relates to previously learned material. They may also write comments about the class or direct questions to me about anything

not yet clearly understood. You may recognize this technique: it has been used in many venues and in a variety of different formats.

I use this student writing as a diagnostic tool to help me judge how well students individually and collectively comprehend the course material. If many students misunderstand a particular point, I address it in the next class session; if only one or two have questions, I respond directly on their papers, which I return during the next class.

When students show a particularly good grasp of the material, make an interesting point, or show growth in their understanding, I write appropriately encouraging or challenging responses.

When students show a particularly good grasp of the material, make an interesting point, or show growth in their understanding, I write appropriately encouraging or challenging responses. In fact, this interchange of writing often becomes another conversation, not completely dry and factual, but frequently incorporating a good deal of humor or whimsy. In some cases we have traded stories, jokes, or poetry. Several of my more visually oriented students have drawn quite elaborate illustrations, to which I sometimes respond in kind, with my own pathetic attempts at drawing.

I get excellent compliance on this exercise by making it a small part of the class participation grade. Each day's writing earns an A; each not turned in, an F. Although the entire semester's writing exercises contribute only a tiny percentage of the final grade, the idea of getting an A every day is a real motivator for many students. Additionally, although I didn't originally create this writing exercise as an attendance-taking technique, it can also serve that purpose.

My use of this technique has evolved during the years I have used it. Early on I had students submit their papers anonymously. I began asking my students to add their names when my college required me to take attendance. I discovered that this gave me the chance to respond directly to students, thereby increasing how well the technique promotes individual learning.

The amount of writing the students generate may suggest that this strategy will only be feasible in small classes, but this is not necessarily the case. My classes at Broome Community College are limited to 28 students, but I have successfully employed this strategy at Cornell University, SUNY Cortland, and Ithaca College, where my classes ranged between 90 and 140 students. The key is that you are not required to read in-depth, only to skim the papers, responding as needed. The motivational/attendance aspect of the assignment is satisfied simply by looking at the name on each paper and checking it off on the attendance roster—in my case, a Quattro spreadsheet that automatically calculates the appropriate credit in students' grades.

This technique gets students interested in and thinking about course topics before you start discussing them, offers a way for students to consolidate the day's learning and ask direct questions about what they do not understand, and encourages regular class attendance. It offers instructors a way to gauge learning and correct misunderstandings before they become solidified, with a minimal investment of time and effort.

Should Students Have a Role in Setting Course Goals?

Maryellen Weimer, PhD

Maybe…but then if you ask students what they want to get out of a course, most give the same depressing answer: an A (never mind if learning accompanies the grade). If you rephrase and ask why students are taking your course, those answers are just as enervating: nothing else was open at the time; it's in the same room as my previous course; my fraternity has copies of your exams on file; my boyfriend's in this class; I heard you were easy; I heard you were funny; your textbook's the cheapest one; or, my favorite on Ludy Benjamin's list, "because my mother took this class from you 24 years ago and she said I could use her notes." (p. 147)

Do answers like these make those who would give students a role in setting course goals dreamy optimists? Perhaps, but maybe there's another kind of question that we should ask: how did students arrive at this dismal approach to selecting courses? Surely they were not born wanting so little from their education. What experiences could have so disconnected them from classroom learning? Has the educational enterprise somehow disenfranchised them?

Those are large questions, and Benjamin's article does not answer them…at least not directly. Benjamin's interest is in course goals and the disconnect that exists between the goals of faculty and those of students. Moreover, the goals focused in the article are not the bogus ones students frequently voice, but rather 17 possible goals for an introductory psychology course (some are relevant to that discipline, most are broadly applicable, and all are listed in the article).

Across the years, Benjamin has given the list to faculty and students, asking each group to identify the three most important ones for an introductory course in psychology. "For college teachers, the most frequently mentioned goal is 11 (content). No other goal achieves anything near the consistency of that selection." (p.147) Not surprising, this number one goal for faculty rarely showed up in the students' top three. They rank highest a goal relating to self-knowledge and understanding, followed by one focusing on the development of study and learning skills, and a third highlighting social and interpersonal skills.

Benjamin uses the list of goals on the first day of class. At that time a discussion about teacher goals occurs, as well as some discussion about this research documenting that teachers and

students frequently do not share the same goals. This is why students are asked to identify their top three goals. The results are shared in the following class session.

Benjamin discusses three ways of responding to student goals: take a totally student-centered approach and adopt those goals for the course. This approach is not recommended. Second possibility: compare student and faculty goals and then show students why/how faculty goals are superior. No recommendation here either—why seek input if you have no intention of responding to it?

Benjamin's choice is the third option, in which faculty and student goals are integrated. "Do not misunderstand this compromise strategy. It is not meant to undermine the professor's goals, nor is it meant to give students the impression that their goals will become part of the course when there is no intention on the part of the instructor to do so…. The purpose of involving students in the process is to create a course that is more meaningful to students and professor, to increase the satisfaction of all involved in the class on both sides of the lectern, and to show students how important it is to become involved in their learning." (p. 148) The rest of the article then explains how Benjamin incorporates student goals into the course. From work attempting to do this, Benjamin has discovered that most often this does not involve changing course content. "More commonly…meeting student goals is about making specific linkages between what you teach and how it relates to student goals." (p. 149)

The purpose of involving students in the process is to create a course that is more meaningful to students and the professor.

Could it be that students take courses for poor reasons because their goals have been ignored or thoroughly sublimated to those more important instructor goals? It's an interesting question and one that can be pursued pragmatically by using (or revising) the list of course goals contained in this article. It might at least be worth a conversation with students…

Reference: Benjamin, Jr., L. T. (2005). Setting course goals: Privileges and responsibilities in a world of ideas. Teaching of Psychology, 32 (3), 149.

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