The Power of Course Design to Increase Student Engagement and Learning

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All professors would like for their students to be prepared when they come to class, to be motivated to learn, and to achieve high-quality learning that prepares them not only for future classes but also for future personal, social, and professional life experiences. But it often doesn't happen that way. What many professors are finding is that students become more motivated and engaged when courses are designed and integrated with significant learning goals. In this article, I will describe the meaning of "significant learning," identify the principles of effective course design, and then offer two examples of what happens when people use these ideas.

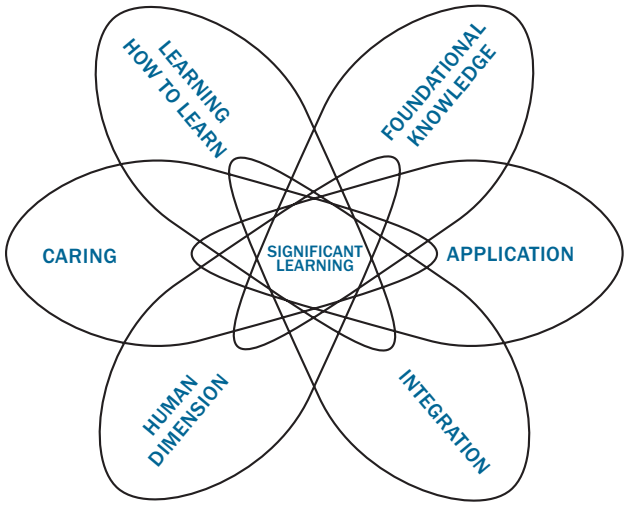
Significant Learning

If we want students to have a "significant learning experience," we must begin by figuring out what we might mean by significant learning. In my book (2003), I offer a taxonomy of significant learning. This builds upon but goes beyond the well-known taxonomy that was created by Benjamin Bloom and his associates five decades ago (1956). Like Bloom's taxonomy, this taxonomy has six general categories of learning, but—unlike Bloom's—they are interactive rather than hierarchical (see fig. 1).

Briefly, these six kinds of learning can be described in the following way:

1. Foundational knowledge: This is the set of facts, principles, relationships, etc. that constitute the content of a course. This we want students to "understand and remember."
2. Application: Most disciplines require students to do something with the foundational knowledge. This might involve some physical skills (e.g., operating technical equipment); more commonly it involves engaging in some kind of problem solving, decision making, or creative thinking.
3. Integration: It is often helpful for students to be able to identify the similarities or interactions between one subject matter and another, or between different theories, historical trends, etc. This is the whole thrust of interdisciplinary learning.
4. Human dimension: When students report that they have learned something in a course about themselves or about how to interact with others in life, this is truly significant.

Figure 1. The taxonomy of significant learning



5. Caring: This is what happens when students change their feelings, interests, or values in relation to a subject.
6. Learning how to learn: Given the fact that we never teach students everything they will ever need to know about a subject, we need to help them learn how to keep on learning about it after the course is over.

The premise is that any course can address all six of these general kinds of learning. And the more of all six the course can promote, the more significant will be the overall learning experience for the student.

How can we do this? By learning how to design our courses in a much more powerful way. We have to learn how to design significant learning into our courses, and this is the purpose of integrated course design (ICD).

Integrated Course Design

The basic idea behind ICD is that, rather than simply develop a list of topics in a course and then provide students with lots of information about each topic, we need to design our courses in a way that is learning-centered, systematic, and integrated. If we can do this, students will respond by becoming more engaged in the work of learning and will succeed in achieving more important kinds of learning.

How does this process work? The key steps are illustrated in figure 2.

Situational Factors

Every time we teach, the situation is a little different. Therefore we need to begin by gathering information about a number of factors:

- Specific context: How many students are in the course? What is the level of the course and the time structure? Will it be offered live, online, or in a hybrid context?
- Expectations of others: Is this course expected to meet certain department goals, university goals, professional licensing requirements, etc.?
- Nature of the subject: The sciences are often "convergent" (working toward a single correct answer), while the humanities are often "divergent" (intentionally seeking multiple interpretations of a piece of work). How do these and other differences in the nature of the subject need to be taken into account?
- Nature of the students: What feelings do they have about this subject? What prior knowledge or experiences related to this subject do they bring with them?
- Nature of the teacher: What beliefs and values do we bring to the course? How do these compare with those of students?

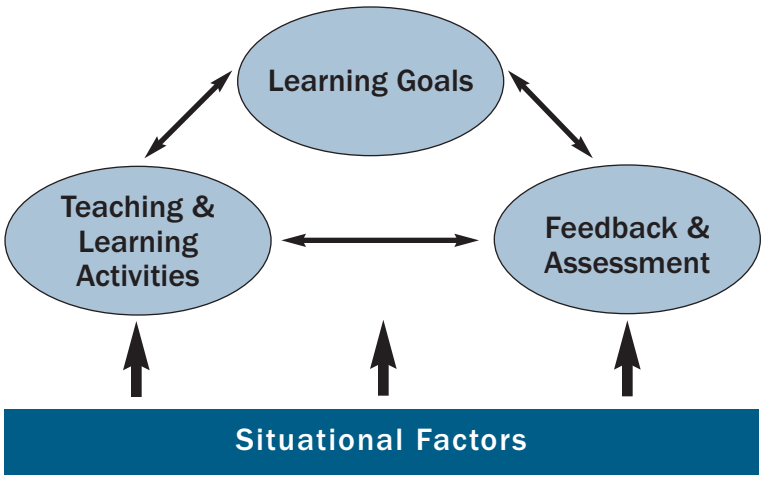
This information is then used (as indicated by the arrows in fig. 2) in making the major decisions about how the course is going to operate.

Learning Goals: What Do We Want Students to Learn?

The first decision in a learning-centered course is about what we want students to learn. As we consider this, we need to go beyond wanting them learn everything about the major topics; we need to formulate more exciting and challenging learning goals. This is where the taxonomy of significant learning can be helpful. It provides us with six kinds of learning to consider for any course.

When formulating our learning goals, it can be helpful to frame this process around a sentence-completion

Figure 2. Model of integrated course design



exercise. The exercise begins with the phrase: "By the end of this course, my hope is that students will. . . ." We then complete that sentence with our learning goals.

The following list shows how we could use the taxonomy of significant learning to formulate a generic set of learning goals. My hope is that, by the end of this course, students will . . .

1. *understand and remember* the key concepts, terms, relationships, etc.;
2. know how to *use* the content;
3. be able to *relate* this subject to other subjects;
4. identify the *personal and social implications* of knowing about this subject;
5. value *this* subject—as well as value further learning about the subject;
6. know how to *keep on learning* about this subject—after the course is over.

Learning Activities: How Will They Learn That?

Once we have formulated important learning goals, we need to identify learning activities that will in fact enable students to achieve those goals. This requires using the principles of active learning (Bonwell and Eison 1991), one of the more important concepts to appear in the literature of college teaching in the last fifteen years. If we want students to achieve more powerful kinds of learning, we need more powerful learning activities.

I adapted the central tenets of active learning into what I call a "Model of Holistic Active Learning." This model proposes that students need some way of

- acquiring the necessary *information and ideas*—this is usually accomplished by out-of-class readings or in-class lectures;
- having an observing or doing *experience*—case studies, problem-solving and decision-making exercises, role playing, hearing stories of others' experiences, etc;
- *reflecting* on the meaning of the information or experience through one-minute papers, weekly journals, or learning portfolios.

It is important that the teacher find some way of including all three kinds of learning activities not only in each course, but also in each of the major units within the course.

Feedback *and* Assessment: How Will We Know If Students Have Achieved the Intended Learning Goals?

A good concept for guiding our efforts on this task is "educative assessment" (Wiggins 1998). This concept proposes that good assessment is assessment that does more than provide a basis for assigning a grade; it educates as well. To do this, our assessment activities need to include several key elements:

- Authentic tasks: A part of assessment requires knowing whether students have a basic understanding and retention of the content. But our assessment needs to focus on whether they can do something with that content.
- Clear criteria and standards: When we assess complex learning, we need to develop clear criteria (the "yardsticks") and clear standards (the levels of achievement on the yardsticks).
- Opportunities for self-assessment: After college is over, students will have to assess their own performance in most situations. We can help them do this well by giving them practice with and feedback on assessing their own work.
- "FIDeLity" feedback: Students need feedback on their work that is **F**requent, **I**mmediate, **D**iscriminating, and delivered "**L**ovingly," i.e., in a user-friendly way.

Integration: Do All the Parts of Your Course Reflect and Support Each Other?

After you have developed significant learning goals, learning activities that reflect the principles of active learning, and educative assessment opportunities, the next step is to make sure all three of these components are integrated, i.e., that they reflect and support each other. There are two tools for accomplishing this.

The first is to use a three-column table to construct the specific components. You want to begin by listing all the major learning goals in the left-hand column. Then, for each learning goal, fill in the rest of the row. Identify the learning activities needed for students to achieve that goal and then the assessment activities appropriate for that kind of learning. What quickly becomes apparent is that, for each kind of learning, you need different learning activities and different assessment activities. An example, just using three learning goals, is shown in table 1.

A second tool for integration is to give serious thought to the teaching strategy you want to use. A teaching strategy is a set of specific learning activities arranged in a particular sequence.

Table 1. Three-column table: An example

Learning Goals	Teaching and Learning Activities	Feedback and Assessment
1. How to solve problems	Practice solving problems, with feedback	Solve new, complex problems
2. How to work with others in a team	Work with others—with periodic feedback	Assessment by peers
3. How to plan for future learning	Identify future learning needs, develop a learning strategy	Assess the learning plan

A good strategy has different activities that serve different purposes within the overall learning process, e.g., providing information and ideas, doing or observing, and reflecting. It is also important that each learning activity builds on what has happened previously and prepares students for what comes next.

Does It Work?

When teachers design their courses this way, does it make a difference in terms of student engagement and learning? The answer is clearly yes. Although these ideas have only been available a few years, professors who have learned about them and tried them are reporting major differences compared to what they were doing before. I will share two of these stories here, one from social science and the other from engineering.

Carolyn Fellahi, a psychology professor at Central Connecticut State University, recently tested the ICD model by comparing two sections of a course on lifespan development, both taught by herself (2006). One section was taught using the lecture-driven method that she had been using for many years; the other was redesigned using integrated course design.

She assessed the students in each section with pre- and post-tests that focused on each of the six kinds of significant learning. The results are shown in table 2.

Scores of student learning in the redesigned course were higher on five of the six kinds of learning, and higher at a level of statistical significance in four of the six. While the scores for "learning how to learn" and "caring" were not where the model would predict, the author noted that "one possible explanation involves the limitations of the test that was developed" to measure these two types of learning.

The second story involves Bill Weeks, a professor of computer engineering at the University of Missouri–Rolla who used the ICD model to redesign a course on coding theory (2003). Weeks had been using the traditional teaching strategy of lectures and homework in this math-intensive course, but students felt overwhelmed by the material, frustrated, and apathetic, and they gave the course low evaluations.

After attending a workshop on ICD, he wrote new learning goals, applied the principles of active learning and educative assessment, and used team-based learning—a teaching strategy that uses small groups in a distinct and powerful way.

In the redesigned version of the course, students did just as well in learn-

Table 2. Differences in pre-test and post-test scores for original course (fall 2004) versus redesigned course (fall 2005).*

Taxon	Original course (mean difference ± S.D.)	Redesigned course (mean difference ± S.D.)	P Value
Foundational knowledge	5.15 ± 4.08	10.23 ± 3.02	<0.001
Application	1.54 ± 0.93	2.39 ± 0.74	<0.001
Integration	1.54 ± 0.87	2.43 ± 1.17	<0.001
Learning how to learn	5.92 ± 2.20	7.06 ± 1.56	0.665
Human dimension	1.67 ± 3.59	11.84 ± 5.07	<0.001
Caring	2.93 ± 0.59	2.08 ± 0.54	0.9333

* Data analyzed using independent samples t-test.

ing foundational knowledge (as evidenced by their performance on the same exams), even though he spent less class time focused specifically on that kind of learning. And they did much better on the new learning goals, which he had not even been attempting to promote before. But the major change reported by the professor was in student morale in the class:

> The student response was nothing less than phenomenal. I never could have anticipated such drastic improvements in student morale. I was especially surprised that the students were motivated to work so hard. Many students reported to me that they enjoyed the workload in the class.

And seeing that change—students working harder and enjoying it more—had a predictable effect on the professor: "Teaching such an excited group of students was an unforgettable experience. It made my job seem worthwhile and very fulfilling. I will be feeding off that student excitement for years."

Conclusions

Professors in higher education are finding that, when they use the model of integrated course design to restructure the learning experience, students respond by becoming more engaged in the learning process and by achieving more significant kinds of learning. This happens because students become co-creators of their own learning, the intended learning has greater meaning, and students are given a wider range of tools to create this learning—often including the opportunity to work closely with other students on promoting each other's learning. ■

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