Designing “Learning” Lessons for the University Classroom

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Content Area: Student Conception of Learning
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Abstract

To be a university professor typically means having to balance research, service, sometimes advising and teaching. The teaching component is often an area instructors are not fully prepared to conduct effectively when entering the classroom setting, most often having been trained in their area of expertise but not on how to teach. The intent of this article is to introduce the 5E’s learning cycle and how it can be incorporated into lesson plans to better engage students and promote learning. The 5E’s learning cycle model is a research-supported process that can promote more powerful student learning and engagement. The model embeds five phases into the lesson plan: Engage, Explore, Explain, Elaborate, and Evaluate. The 5E’s learning cycle is a method that can assist instructors in drawing the students into the lesson and promoting active learning.

Keywords: learning cycle, 5 E’s, active learning, constructivism

For most university professors, teaching is considered a major part of the job description. How big a part depends upon their institution, their rank, and their personal interests as they balance classroom work with research, advising, and service. For those professors whose interests lie in teaching, or those working at institutions which say that teaching is their mission, becoming an expert teacher sometimes proves problematic since most university professors receive little-to-no “teacher” training.

Faced with that first (or second or eighth) semester of students, we teach as we were taught. Without systematic teacher training, we structure our courses to mirror the ways we were taught. We tend to imitate our past instructors’ kinds of assignments, assessments, and programmatic or departmental alignments. Our specific teaching decisions mirror what we saw as students, including the style and extent to which we lecture, use power point, lead class discussion, incorporate small groups, rely on individual work, as well as how we assess student learning. The logic behind this approach is that we learned from those courses, and therefore, those same teaching strategies should work for our students as well. In some cases, they do. In copying what we recall having seen, however, we quickly run into several problems: 1) we mirror what we remember, which means we are teaching specifically, sometimes exclusively, to our personal learning styles; 2) the style that worked for our favorite teachers may simply not work for us; and 3) as students, we rarely if ever have access to the class planning and other behind-the-scenes structuring that our favorite instructors used. We quickly learn that trying to become an effective teacher requires an almost “alternative culture” in terms of approach: a shift from teacher-focused to student-focused thinking (Gibbs & Coffey, 2004). The way we approach teaching our content determines how much content our students will incorporate into their learning.
The need for instructional design training becomes increasingly clear in light of fact that student evaluations of teaching are remarkably stable over time (Marsh, 2007). In other words, experience alone is not enough to improve teaching from the level where instructors naturally start (which may be high, depending on the individual). Improvement is possible with “systematic intervention that includes consultation with an external consultant” (Marsh, p. 786). There is an important relationship between instructional design knowledge and classroom teaching performance (Hardre’, 2003).

What, then, are the traits of an effective teacher? Mowrer, Love, and Orem (2004) compiled the top “teacher qualities” based on surveys of more than 300 undergraduate students. Their list reveals a balanced combination of personality traits, knowledge of content area, and instructional skills. The following traits made the “top 10 list” in both of their studies:

- Approachable
- Knowledgeable
- Enthusiastic
- Encouraging/Understanding
- Realistic Expectations
- Creative/Interesting
- Accessible
- Effective Communicator
- Respectful

This list was consistent over a variety of factors, including the student’s GPA, year, gender, and perceived course difficulty. Rossetti and Fox (2009) obtained a similar list of traits when they examined the teaching statements of 35 Presidential-Award-winning university professors. Enthusiasm appeared in their top-four list as well, as did presence, promotion of learning, and being a lifelong learner.

While certain factors of excellence in teaching are personality based, others, including effective communication, realistic expectations, and the “creative” and “interesting” ways one structures the class, can be learned and improved through instructional design training. Komarruju (2008) found that after instructional design training, university teaching assistants reported an increased sense of self-efficacy in the classroom and, on a correlated note, liked teaching more. It stands to reason that instructors who enjoy teaching might be perceived as more enthusiastic. These findings serve as an important reminder for instructors who hesitate to add instructional design training to an already full schedule; in addition to improving teaching performance and efficacy and student learning, instructional design training has the potential to increase job satisfaction.

When offered as a course to graduate teaching assistants, instructional design training was effective across disciplines. A professional development teaching course was useful for science graduate students, helping them to approach their teaching in a way that was more inquiry based (Baumgartner, 2007). In math, a three-credit instructional development course helped graduate teaching assistants gain confidence as instructors (Harris, Froman, & Surles, 2009), with positive results in student learning; students reported these instructors were more receptive to questions (approachable), more available for out-of-class consultation (accessible), and more likely to present information beyond the test (knowledgeable).
Even very short-term trainings make a difference, according to multiple studies focused on graduate teaching assistants. Two three-hour sessions increased teacher efficacy, student engagement, and students’ perceived learning for graduate teaching assistants according to Hardre’ (2003). Other effective instructional design trainings occurred during one week of in-service training (Komarruju, 2008), and four weeks among undergraduates (Yalcin & Bayrakceken, 2010). Regardless of the length, instructional design training provides a valuable entry point into the complicated conversation of teaching and student learning.

It appears that almost any type or length of teacher training seems to have a positive impact on student evaluations and teacher self-confidence. One powerful entry point into instructional design for university faculty deals with designing effective lesson plans which emphasize student learning rather than mere coverage of material.

A “Learning” Cycle

Learning may be defined as a “change in thoughts, beliefs or actions” (Merriam-Webster’s Collegiate Dictionary, 2002). We learn (change) for what we perceive to be our own good reasons; no one can make you learn anything: memorize perhaps, but not learn. Our thoughts, beliefs, and actions are a result of our life experiences and our genetic makeup. We “think” about ideas, “believe” them, or “do” them because they meet our needs. All “learning,” therefore, is personal learning. Memorization does not necessarily indicate learning. Most facts that are memorized are also then forgotten within 48 hours of an exam. Therefore they do not “change” a person’s beliefs, thoughts or actions.

Any “learning” cycle lesson plan is designed to help structure or restructure what instructors already do in their everyday classrooms. The “learning” cycle is not meant to replace lecturing, rather to place the “lecture” within the process of student learning. Indeed, to leave out the lecture component would be problematic, as lecturing allows the instructor to clarify ideas, mediate student misconceptions, and present and add important content. The “learning” cycle proposed below merely suggests that the class not start with lecture and that lecture be supported by other thinking and learning strategies. The 5 E’s learning cycle offers a structure that provides for an increased emphasis on student thinking and learning. Designed to be flexible, the purpose of any “learning” cycle lesson plan is to push students beyond the mere memorization of facts, and to help them incorporate their learning into their lives.

All “learning” cycle lesson plans attempt to mirror what the literature says about how people learn (Caine & Caine, 1994; Darling-Hammond, et al, 2008; Dewey,1938; Jensen, 1998; National Research Council, 2000; Sylwester, 1995). There seem to be three principles that need to be addressed for effective student learning:

1) students come to the classroom with prior knowledge which must be explicitly addressed if learning is to be achieved,

2) students need to organize and use knowledge conceptually if they are to apply it beyond the classroom, and
3) students learn more effectively if they understand how they learn and how to manage their own learning (Darling-Hammond et al.; Hanuscin & Lee, 2008; National Research Council).

In other words, these three learning principles ask that students access what they think they already know about the subject and then make connections to a big idea within the field, all within an environment that makes explicit the learning process.

Current learning theory, also labeled as constructivism, (Bevevino, Dengel & Adams, 1999; Colburn, 1998; Ormod, 2000), attempts to honor the idea that people are naturally learners and that everyone makes their own meaning from their experiences. There are five overarching principles evident in a constructivist classroom:

1) teachers seek and value their student’s point of view,
2) classroom activities challenge student suppositions,
3) teachers pose problems of emerging relevance,
4) teachers build lessons around primary (central) concepts, and
5) teachers assess student learning in the context of daily teaching (Brooks & Brooks, 1999).

The 5 E’s “learning” cycle lesson plan attempts to directly address each component. Overall, the new science of learning is beginning to provide knowledge to improve significantly people’s abilities to become active learners who seek to understand complex subject matter and are better prepared to transfer what they have learned to new problems or settings (National Research Council, 2000, p. 13).

A “learning cycle” lesson plan approach would then attempt to help people continue their “learning” by:

1) examining what they think they know, believe or do – with the point being to create cognitive dissonance, disequilibrium or curiosity in other interpretations; this process makes learners aware of their current structures of thought, belief, or actions,
2) providing an alternative rationale or structure that fits their prior experiences and thoughts PLUS the new one more effectively, and
3) allowing them to “practice” their new structures of thought, belief or action. Practice makes permanent.

The 5 E’s “Learning” cycle lesson plan model

There are many types of “learning” cycle models described in the literature such as Karplus & Thier (1967); 7 E’s (Gonen & Kocakaya, 2010), which are Excite, Explain, Expand, Extend, Exchange, and Examine; and EIMA (Schwarz & Gwekwerere, 2006), which consist of Engage, Investigate, Model, and Apply. Most models evolved from a learning cycle model that focused on three stages. The 5 E’s lesson design (Bybee et al., 2006) is based on the Atkin and Karpul (1962) learning cycle that focused on exploration, invention, and discovery. The 5 E’s lesson design: Engage, Explore, Explain, Elaborate, and Evaluate, expands from the three traditional stages.

The 5 E’s “learning” cycle was developed by Biological Science Curriculum Study (BSCS) and has been used since the 1980s in elementary, middle, and high school biology science programs.
Students who experienced 5 E’s lesson design learned more science content, science process skills (Buntod, Sukrengam & Singseevo, 2010; Yalcin & Bayrakceken, 2010), and critical thinking skills (Buntod et al.). Students also believed that the 5 E’s design had a positive effect for engaging them in course content and contributed significantly to their learning and interest in the course (Yalcin & Bayrakceken).

The 5 E’s “learning” cycle lesson design embeds the following structure. The first stage is Engage. The purpose of the Engage stage is to help capture the student’s attention, create connections between what the student already knows, and provides the student with direction for the lesson. The Engage stage helps create and/or sustain a positive learning environment, which fosters community building. It also provides students with a context for their learning. They engage in material that they learned previously and understand how this knowledge can be applied today and in the future. The Engage stage can help students understand how the learning will meet their needs and ideally connect them to the lesson. “Learners of all ages are more motivated when they see the usefulness of what they are learning and when they can use that information to do something” (National Research Council, 2000, p. 61).

The next stage is Explore. In this stage, the students are asked to explore the phenomena being studied. Students should be in small groups in this stage and are expected to be active participants. This stage is based on social learning theory, in that students learn from observing and interacting with each other.

Explore activities fall into two major categories: 1) a new concrete (hands-on) experience can be provided for the students to examine, manipulate, and explore the phenomena, or 2) the students can be asked to explore what they think they already know or believe about the phenomena or concept. In this type of activity, the students could discuss their understanding, similarities, and differences by accessing their prior experiences, definitions, and mental models. It is important that the exploration is made explicit by members of each group to truly explore the phenomena. The hope for an effective Explore is to create cognitive dissonance, disequilibrium, or curiosity in each learner. The Explore stage should push the students into wanting to learn more in the lesson. This is the essence of active learning. It allows the students to control their own learning. “It can be difficult for students to learn with understanding at the start; they may need to take time to explore underlying concepts and to generate connections to other information they possess” (National Research Council, 2000, p. 58). The Explore stage creates space for these connections to happen.

Explain is the stage that follows Explore and most closely resembles a normal teacher lecture. Students in this stage explain their understanding of the phenomena based on the Explore stage. The teacher acts as a guide to develop a collective interpretation of the (new) concept, idea, or experience. New vocabulary may be introduced to label what the students may have already deduced through the Explore phase. This stage creates a new understanding that incorporates their prior understanding into a new more effective structure of the phenomena. This stage should ease their dissonance and disequilibrium and provide some resolution to their curiosity. A good Explain uses the Explore answers, thoughts, and/or experiences as the springboard for the new information, model, or schema. The Explain stage includes all the information of a
traditional teacher lecture, but using or referencing student Explore answers into the lecture material.

The Elaborate stage allows students to apply concepts in different contexts and to build their understanding and skills related to the Explain. Elaborate can allow for either a connection of the new understandings to other concepts or application of the new structures to a task. This stage provides an opportunity to practice using the phenomena to further establish learning. Practice make permanent, and the opportunity to try out new thoughts, beliefs, or actions can help solidify the learning experience.

The final stage is Evaluate. Although it is listed as the final stage, in actuality, evaluation occurs informally throughout the lesson design. Each stage provides opportunities to evaluate the students’ understanding of the tasks within the learning cycle. Self-assessments are part of the learning process and can be incorporated into each stage. This continual evaluation assesses the students’ development and the lesson effectiveness as the lesson progresses. The end-point evaluation is usually more summative of the entire learning cycle and evaluates the overall lesson effectiveness. This evaluation could be a quiz, test, performance with rubrics, or a homework assignment. Ultimately, the student learning should match against the lesson design, so it is critical that the evaluation measures the expected learning.

A quick summation of the 5E “learning” cycle lesson plan would be to: 1) get the students interested in the topic of the day, 2) find out what they already think they know, 3) provide more accurate information grounded in research, 4) invite students to apply their new knowledge, and 5) assess the results. The example provided below comes from an introductory English course, Composition 101. The topic of the day: Using vivid language to make writing more interesting.

Engage:
1) Show the YouTube clip: Taylor Mali - “Like you know.”
2) Say: Yesterday we did a peer review of your paper drafts. Remember when Joanne commented about how segue sentences were harder than she thought, and then Joe talked about his strategy for making them easier? Today we are working on using vivid language, which we will incorporate into our papers that are due our next class meeting. Remember that those papers will be 20% of your course grade.
3) Say: So you might be thinking, “Why does it matter that I use vivid language?” Vivid words and language paint pictures in your heads that are vibrant, tell a powerful story and communicate what you truly want to say. “Big” is not the same as “gargantuan,” “smell” is not the same as “fragrant,” and “loud” is not the same as “pounding in your head like 10 pound sledge.” Language is powerful, and to communicate effectively enhances your quality of life in school and in every part of your human experience.
4-8 minutes
(Evaluate - make sure students are watching the YouTube clip and paying attention with their eyes and body language)

Explore:
1) Put students into groups of threes (random assignment).
2) Have them construct a Word Graph using the following terms: says, states, claims, suggests, denies, asserts, insists, thinks, believes, hopes, proves, enumerates, etc.;
3) x axis: from negative to positive
4) y axis: from least to most authoritative
5) Show graphs on document camera.
6) 7-12 minutes
(Evaluate - check to see that groups are graphing the words and have a rationale for their placements)

Explain: (interactive lecture)
1) Lecture on shading for meaning.
2) Reference their graphs to drive your lecture. Pick out one area, ask why they graphed them the way they did, and then give your lecture about how your field talks about those ideas.
3) 20-30 minutes
(Evaluate - ask for two questions/comments about “shading for meaning”)

Elaborate:
1) Have students reread their paper drafts and circle the verbs that they used.
2) Have them replace some of those verbs with more vivid language.
3) 10-20 minutes
(Evaluate - move around the classroom, answering individual questions, and checking on student work-in-progress.)

Evaluate:
1) Grade papers when turned in next class meeting.

Modifying current lessons to mirror a 5 E’s “learning” cycle lesson plan is a great way to begin thinking like an expert teacher. You are sharing with students how learning is connected to their daily lives and why it is important to learn. You are also asking them to share what they think they know before you start telling them the more accurate and refined answers. You are also letting them practice those new thoughts, beliefs or actions in a safe learning environment. These are all very positive steps in helping students “learn” what they need to learn.

Sometimes it is easier to start fresh rather than modifying what you are currently doing. For new lessons, a different type of thinking may be useful. Utilizing a Backwards Design model of instruction (Wiggins & McTighe, 1998) allows for highly effective lessons to be planned beginning with “what do you want students to “learn” by the end of the lesson?” The following steps provide guidance to new lesson design.

**Application to your Classroom**

Step 1. Start with “how will you know if your students have understood what you want them to know, or do, or understand by the end of the teaching episode?” What is the goal of the lesson, in terms of student learning? - Evaluate.
Step 2. What practice opportunities will they need to “get” the point of the lesson? - Elaborate.
Step 3. Plan your teaching notes – what content do you expect them to know? Not everything is of equal value. – Explain (make sure it matches your Evaluate).

Step 4. Pick an Explore activity that gets them to share what they already know about what you are going to be “explaining” later. Examples include: define this term, construct a graphic organizer that represents what you think you know about the topic, or turn to your partner, say your name and then share an example of when you experienced this concept. - Explore.

Step 5. Remind the students of what you did last class, the topic for today and when the next big assessment will be. Find a contemporary example or YouTube clip that has something to do with what you are going to be talking about that day (or some other interesting “hook,” story or purpose). - Engage.

Discussion

When teaching is just one part of your workload and you have no specific training, it is difficult to know where to begin the learning journey. Similar to conducting research, you begin with what you know and develop a question to guide you through the process, the entire time learning more about what you are investigating. How you teach works the same way, by pulling from what you know and how you prefer to learn and along the way hopefully adding to your knowledge base. The good news is that even a little bit of training seems to make a difference in students’ views of instruction and in helping instructor feel more confident about their work in the classroom. The intention of this article was to introduce the use of the 5’s learning cycle as a means to engage the students in the instructional activity. We have put forth the qualities, as perceived by the students, of what makes an effective instructor. The next step is to find a way to reach the students by engaging their learning styles, thus inviting them to learn. Learning is always in students’ hands, as only they can control whether they will incorporate their learning into their thoughts, beliefs, and actions.

As outlined in the example, the 5’E’s learning cycle not only incorporates multiple learning styles but also involves the students in the learning process. Students are introduced to the new content and allowed to play and interact with the material while developing new ideas, concepts, and questions. The instructor has the opportunity to step in and assist students in pulling the material together and to contribute new ideas and material. The process is finished up with the students taking the teacher’s new material and mixing it with what they have created, thus producing the final outcome that can be assessed. Altogether, using the 5 E’s lesson cycle design model will meet students’ needs and obtain the desired learning outcomes in creative and intuitive manner, making teaching more engaging for all involved.

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