Communicating a New Model: Learner-Centered Strategies in Faculty Development

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Despite what is known about the value of active learning, it is still possible to experience a lecture-based presentation in many professional development venues. The author suggests that a contributing factor may be that facilitators have not transferred their knowledge of learning to the context of faculty development. A proposed workshop is used to illustrate how learning principles can be embedded in faculty instruction. The model itself covers transfer as its content and specifically utilizes pedagogies demonstrated to promote transfer. The article's aims are to model deep learning approaches, develop more reflective education development professionals, and contribute to a shared vision of effective professional development practices.

Sabbaticals ROCK. Mine has given me the luxury of playing with ideas. As a result, I think I've found an answer to something that has puzzled me for years. Many professional development workshops I have attended are themselves not good examples of putting to use what is known about how people learn. The continued prevalence of PowerPoint presentations, followed by discussions among participants at a table, followed by a report out to the larger group is surprising. This format largely represents an expert instructing the audience. Discussion and goal setting seem to be add-ons rather than built-ins. Developers rarely ask faculty to construct knowledge for themselves and then use that knowledge in ways that allow for feedback and reflection. This approach has always seemed ironic to me. Workshop leaders have certainly been knowledgeable, but too many have not transitioned from talking about principles of learner engagement to actually using them.

Lack of time may prevent many facilitators from updating their approaches. Some developers may worry about how the audience will respond. These same factors have been identified (Brownell & Tanner, 2012; Henderson & Dancy, 2007) as contributing to faculty members' slowness to adopt alternatives to direct presentation for undergraduates. There is also the pressure, as there is in a classroom, to convey large amounts of information in short periods, and a presentation seems the most efficient way to do that. But if workshop leaders succumb to this temptation, how seriously can their message be taken that less content means better learning?

Recently, I've come to think that another factor may be at work. Perhaps it's an issue of lack of transfer: Facilitators do not see the understanding of learner-centered teaching as applicable to professional development. This absence of transfer may occur because many persons now involved in faculty development were not formally trained in learning theory; they are largely self-taught. As a result, the breadth and depth of understanding required to apply ideas beyond the context in which they were learned may be lacking. This has certainly been my experience. I first read *How People Learn* (National Resource Council [NRC], 2000) and *Understanding by Design* (Wiggins & McTighe, 2005) to improve my classroom teaching. It took me years of time and practice to build the knowledge and experience to be successful and comfortable at teaching. It's a new struggle now to apply those same ideas to working with faculty. Particularly difficult has been applying the concept that learning involves knowledge construction on the part of the learner. The perspective that students have knowledge and experience to which I can connect and on which they can build has become automatic for my classes, but I've not completely integrated this when working with colleagues. I too easily slip into thinking of myself as knowledge disseminator.

Mine is not an isolated difficulty. In a meta-analysis of publications on undergraduate science, technology, engineering and mathematics (STEM) education reform, Henderson, Finkelstein, and Beach (2010) found that the majority of articles written by discipline-based STEM education researches take a prescriptive approach in which a defined outcome (e.g., an instructional strategy or curricular approach) is disseminated. In contrast, faculty development researchers are more likely to take a constructionist (or what Henderson et al. call an emergent approach)—assisting faculty in developing their reflective skills, for instance.

Surprisingly, transfer of an understanding of learning into action is difficult even for those trained in the learning sciences. Halpern and Hakel (2003) state that for faculty who are content experts in the learning

sciences, "there is precious little evidence" (p. 37) that they apply such principles in their own classrooms. They teach as they were taught, using teacher-centered methods. Tagg (2010) argues that numerous parallels (e.g., the time horizon, type of feedback) between faculty teaching students and education specialists teaching faculty exist and that both reflect an institutional paradigm driven by instruction (expert telling) rather than learning (student constructing). He advocates that teaching and learning specialists become more intentional in their use of deep approaches to learning as design principles in their work.

Such an approach coheres with research in industrial and organizational psychology (see Grossman and Salas, 2011), which shows that embedding learning principles is also vital to adult workplace learning. Behavior modeling, in which trainers illustrate the desired outcomes, is a key component to successful workplace training. In an academic context, faculty need to experience, not just hear about, a learner-centered classroom. Among Tagg's (2010) concluding remarks is this: "If teachers teach as they were taught, then it should be a central mission [of educational specialists] to teach them the way we want them to teach" (p. 30).

There is a profound symmetry here. If faculty want students to learn to transfer their knowledge to new situations, then faculty must teach their students how to do that using evidenced-based approaches that promote deep learning. Likewise, if faculty are to learn to teach for transfer, then they must be taught in ways that model teaching for transfer. But if professional developers are to model teaching for transfer, they must transfer their knowledge to the context of teaching faculty.

Part of what brought me to think through these confounding issues is the 2012 report from the National Research Council entitled *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century* (ELW). I read it first with my molecular biology class in mind, but after being disappointed in several teaching and learning workshops I've gone back to it with the point of view of someone teaching faculty about learning.

This article presents a proposed workshop that utilizes in its design the pedagogical features known to promote transfer. It forefronts behavior modeling and prompts faculty to transfer their learning to their classroom. It also invites faculty to collaborate on making meaning from a complicated research literature, which is an emergent rather than prescriptive approach.

So, What Is Transfer?

I first encountered the term *transfer* when I read *How People Learn* (2000). I struggled mightily with this idea, even though it seems simple and incredibly obvious to me now. Transfer, the cognitive science term for using something you know in a new context, is at the heart of higher-order thinking and occurs when you apply, analyze, evaluate, and create. Learning for transfer requires not only a depth of knowledge but also an understanding of the ideas in relation to the broad organizing principles of the field. Transfer also requires knowing how, why, and when to use that knowledge. Someone can have the knowledge and the mental organizing structures but still fail to see that the information relates to the problem at hand; their knowledge remains inert.

Research (reviewed in NRC, 2012) has shown that transfer of information and skills to a new context is more than a cognitive (e.g., memory and reasoning) function. Intrapersonal and interpersonal skills are also important. Intrapersonally, high motivation, self-regulation of behavior and emotions, intellectual openness, appreciation for diversity, and engagement in metacognition are positively associated with transfer. Interpersonal skills such as expressing ideas, interpreting others' direct and indirect messages, and resolving conflict are also important.

Undergraduate teaching offers multiple opportunities to encounter issues in transfer, issues usually brought to our attention by the difficulties many students have in doing it. For instance, we teach a concept in class, ask students to apply it on an exam, and may find that only a few are successful. Or, some students turn in a paper written late in a semester that doesn't include a citation list, which was taught earlier in the semester. Lack of transfer also occurs when students have trouble using concepts from a prerequisite course.

A key point in ELW (2012) is that while characteristics of learners determine their ability to perform higher order thinking, characteristics of the environment are also critical. Simply hoping that students will learn to evaluate, or problem solve, or generate new ideas is not an effective teaching strategy. Faculty must take some responsibility for student failure to engage in higher order tasks; it isn't entirely the student's fault he or she can't use synthetic thinking on a test question. Likewise, I suspect professional developers are at least partly responsible for the reported (Ebert-May et al., 2011) lack of long-term change in faculty after workshops. Participants gain knowledge but falter in transferring it to their own contexts, perhaps in part because they've seen few examples and gain little practice doing so (also see Tagg, 2010).

ELW explicates the pedagogical strategies empirically shown to make learners better able to use information learned, whether the learners are students studying DNA or faculty learning about learning. As you might guess, conditions conducive to transfer require more than a lecture or ill-defined discussion. Six features of instructional design have been shown to develop cognitive skills so that learners not only understand the material and its relation to organizing principles, they also learn how and when to use it in the future:

1. Using multiple and varied representations of concepts and tasks;

2. Encouraging elaboration, questioning, and self-explanation during learning;

3. Using guidance and metacognition to support challenging tasks;

4. Presenting information in the context of examples or cases;

5. Priming learner motivation; and

6. Providing opportunities to practice and receive formative feedback on performance towards the stated learning goals.

Faculty *can* help students get better at transfer. Similarly, workshop facilitators can teach for transfer. The prevalent "Do what I say, not what I do" model is weak. Instead, professional development must help faculty bridge the gap between theory and practice by making the workshop design a robust model of learner-centered teaching.

A Different Kind of Workshop

What does it mean to say that a workshop takes an emergent perspective (Henderson et al., 2010)? Or that it employs behavior modeling (see Grossman and Salas, 2011)? What might a workshop look like if it were designed to promote transfer? I offer one model below. The facilitator does little if any direct presentation of material; rather, he or she is guide, coach, time-keeper, and synthesizer. Discussions produce products that are reviewed by others. Activities are scaffolded to progress from understanding to applying, evaluating, and creating. Faculty construct a deep understanding in collaboration with others. They are prompted to reflect and be metacognitive.

My goal isn't to disseminate a tested workshop. It is to prompt education specialists to transfer what they know about learning to their work with faculty. I do this by outlining and providing commentary on a day-long workshop that covers the concepts of teaching for transfer.

The Workshop:
Getting Students to Think—
Instructional Design to Promote Transfer

Learning Goals

Backwards design (Wiggins & McTighe, 2005) suggests that a first step in instructional design is to decide what participants will be able to do at the end of a learning session. These learning goals then guide the choices of what and how to teach and what and how to assess. In this proposed workshop, participants will

- list and elaborate the six features of instructional design that support the ability of students to transfer what they have learned to new contexts;

- experience a variety of teaching strategies;

- recognize those strategies as examples of "teaching for transfer";

- evaluate classroom materials for their abilities to promote transfer;

- re-design materials for use in their own classrooms in light of the six features that promote transfer of knowledge.

These goals would be repeatedly pointed out and used to guide assessment of the workshop.

Homework

Participants would arrive at the workshop having already done some learning. The assignment would be short in hopes that even the busiest person could complete it. People should arrive with a general understanding of transfer and an introduction to the vocabulary in the field. A short five-page reading from ELW would accomplish this (see, for example, ELW, pp. 161-166).

I would also ask participants to bring with them for use in the workshop the following:

- a copy (electronic or paper) of each of the readings that form the basis of the workshop;

- six paper copies of a syllabus/course description of a course they are teaching;

- six paper copies of a description of a writing assignment used for their class (no longer than one page);

- materials (electronic or paper) associated with a class day that they would like to redo (lecture notes, the text book, images, handouts, homework, discussion questions, web materials, photos of students doing work, etc.).

This homework strategy readily transfers to other topics. As with students, there will undoubtedly be participants who have not done their homework. The structures of the workshop sessions make some accommodations for this.

Arrival at the Workshop

Well-designed learning environments give people a sense of community and help them transition from life outside to the task at hand. Introductory moments can also be used to gather information about the participants. As people arrived, I'd ask them to place a tic mark on each of three continua: "I did not do the homework/I did the homework"; "This reading had few new ideas for me/This reading had many new ideas for me"; "I did not enjoy the reading/I found the reading fascinating." Importantly, this information gives me a sense of where people are so that I can adjust sessions to better meet participants' needs. I am particularly interested in knowing how much knowledge and experience is in the room, both so that I can tailor what I ask people to do, and so I can draw on the expertise that participants have. The information also lets me make strategic decisions. For instance, if only a few people have not done their homework, I can let them melt into the larger group. If a large proportion arrive unprepared, I can have them form a group on their own or ask them to do the reading during the time set aside for the quiz. As part of the introductory comments I'd discuss the continua, keeping the tone humorous and, where possible, drawing parallels between undergraduates showing up for a class and faculty coming to a workshop.

The workshop starts with group formation. Nametags would display department and years in an academic career as well as name. I'd ask participants to arrange themselves roughly according to their existing understanding of the learning principle (e.g., strong at one end of the room and less strong at the other). Participants would first pair with someone not well known to them and from another discipline and then aggregate with others from another location in the room to create groups of about six. Because explaining and questioning are known to promote transfer, diversity in discipline and knowledge about learning within their group is a goal.

As with most classroom activities, there are multiple goals besides the obvious one of forming a group. One is to allow people to meet and greet each other to continue to build community. Another is to provide faculty with examples of alternative ways to form groups. A third is to model how to deal with momentary chaos—I would be time-keeper and shepherd.

A Quiz

Next, the facilitator could administer a brief "quiz" based on the homework. The goals are to check that people understand the basic ideas and to settle them into the content for the day. People would first work individually and without the aid of a copy of the reading. Once they had gotten as far as they could, they might then refer to the reading or others in the group to check or expand on their answers. I'd mention that if persons did not do their homework, this would be a time to skim the reading. The quiz questions are shown in Figure 1.

Checking answers against the reading and with others in the group provides individuals with sufficient feedback that I would not need to do a larger group debrief. I would make announcements at intervals to be sure the groups were moving along: "Groups should be finished with question xx at this point"; "We've got seven more minutes left"; "We've got one minute left; please wind down the conversations."

Quiz questions could be adapted easily for any workshop. The main goals are to check basic understanding, expose possible misconceptions, connect with what participants know/feel, and provide some points for reflection and metacognition later in the workshop.

I've elected to give a quiz to provide faculty with a student-like experience and to model how a quiz can go beyond checking content knowledge and connect with the learner at a personal level. The activity also demonstrates how feedback can be provided without grading.

Figure 1
Quiz Questions

1. What are the three domains of competence?

2. Give an example of a competency from each of the three domains.

3. Much more research has been done in one of these three. Which one?

4. Do you personally believe that intelligence is malleable?

5. Define transfer.

6. On a scale of 1 to 10, with 10 being highest:
   a. to what degree does your teaching allow students to apply their knowledge?
   b. to what degree does your classroom help students develop in the three different domains?

Individual Reading for Content

For the next workshop segment, participants would read a section of ELW (2012) and answer questions about it. This is the main content of the workshop. Copies of the questions, shown in Figure 2, would be on the tables. Assigning a short reading is a strategy that easily adapts to any workshop topic. One advantage of this approach versus a presentation is that participants can focus, contemplate, skip over, and explain to themselves based on their own prior experiences, specific interests, points of confusion, etc. This constructionist approach allows novices as well as more experienced persons to get something from the exercise. Three quarters of an hour would be given to do this assignment, with a coffee/bathroom/check e-mail break following. As participants re-gathered, I would ask them to report within their group the degree to which their teaching now utilizes the ideas in the reading on a scale of 1 to 10. I'd also ask everyone to think about what it would take to move one step toward the higher end and to make that his or her personal goal for the workshop. Again, providing a reading and the time to complete it could be applied in many workshops. The items provided to faculty might be a diagram, outline, or graphic rather than a reading.

Group Understanding of Content

When the groups reconvened at their tables, they would find poster-

Figure 2
Questions for Individual Reading

1.   List and explicate the six features of instructional design that have been empirically shown to promote transfer. Where possible, identify an example from your own teaching of these features.

2.   Identify an area in which you have questions and/or comments.

3.   Identify an idea that is new to you.

4.   This question asks you to revisit one from the quiz. If your answers have changed, reflect on why that is so. On a scale of 1 to 10 with ten being highest:

     a.   to what degree does your teaching allow students to apply their knowledge

     b.   to what degree does your classroom help students develop in the cognitive domain?

making materials (e.g., large pieces of paper, markers) and printed instructions for the next segment (see Figure 3). This group work can create an environment that promotes transfer in several ways. First, it provides another representation of what is being learned. Second, participants are actively integrating the material they just read into their existing knowledge base. Third, people receive feedback from peers about their level of understanding. Group work also offers opportunities for explanation and questioning. This technique, which is a way to focus a discussion, would work well with lots of different content.

Personal Reflection

After the shared viewing of posters, participants would return to their tables, place their poster where it is visible, and retrieve the items I asked them to bring with them—syllabus, writing assignment description, and materials relating to a class day. Individuals would first review their own teaching documents and write a paragraph that reflects on the degree to which the documents they have in front of them support or promote transfer of knowledge and skills. The poster itself serves as a reference and prompt during this exercise. As participants do their personal reflection, I would point to a handout (see Figure 4) that serves as another set of prompts and also provides feedback on how well a group's poster captured the features compared against my own reading of the material.

Figure 3
Instructions for Poster-Making

Your task is to work as a group to create a poster that represents your reading. You will use this poster throughout the rest of the workshop to remind you of ideas. A simple approach is to list the features of instructional design that promote transfer and annotate each item. An annotation may consist of examples, specialized vocabulary, drawings, etc. Other formats for representing the information are encouraged, but be alert to the time limit. Whatever the final representation looks like, the group must come to a consensus about what goes on the paper. That is to say, if the group decides to subdivide the work so each person focuses on a different feature, there must be group discussion before items are written on the poster.

Your group has 45 minutes. This is a strict deadline. At the end of the 45 minutes, the 'posters' will go on the walls and everyone will circulate to look at the items on other groups' lists. During this time and as people circulate, I encourage groups to modify their own posters based on the other ideas they see and conversations they have.

In the last five minutes of the personal reflection time, I would ask participants to specify a goal that moves them toward creating an environment that better supports transfer of knowledge and skills. Persons should identify one or two features of teaching for transfer on which they will focus when thinking about their own courses (e.g., incorporate more informal feedback; find everyday examples of content). This exercise is a defined opportunity for transfer of information to a new context. Participants already will have engaged in small acts of transfer as they identified examples and processed information in creating and then discussing the poster. Having people bring examples of their course materials and perform a critique based on the new information is a strategy that could be used in professional development workshops on technology, inclusion of writing assignments, use of quantitative reasoning, teaching professional skills, and the like.

What to do if people do not have their materials? This is an exercise they can do from memory, although they will have a general sense rather than specific evidence.

Pair-Wise Sharing

The next segment is also a defined opportunity to engage in transfer,

Figure 4
Prompts for Personal Reflection

1. How many different representations of material (reading, video, diagram, graph, podcast, animation, on-line quiz, discussion, etc.) do you include during the typical week?

2. Do you ask students to read, write, draw, sort, brainstorm, or critique material as a regular part of class time?

3. Do students have multiple opportunities to engage in explaining a concept to themselves or others either in writing or discussion?

4. Do you regularly ask student to explain their reasoning when they offer an answer?

5. What kinds of opportunities do students have for asking questions?

6. How often are learners in your classroom asked to perform a task (write a poem, interpret a data set, find a passage that supports a statement, identify a different point of view, find an example, etc.) on which they then receive feedback that can be used to improve their performance next time?

7. How often do you use familiar examples to explicitly illustrate points?

8. How often do you make your own thinking through a problem/topic apparent to students by talking out loud?

9. In what ways do you relate the topics/concepts that students are learning to their lives?

10. In what ways do you help students understand how the skills they are developing will be used in the future?

11. Do you ask students to identify how topics covered in the course are related to their lives?

12. In what ways do you help students attribute their performance to effort rather than innate ability?

13. To what degree are students aware of the learning goals you have on a daily basis?

this time in an evaluative context. Each group of six divides into three pairs. Each member of each pair exchanges descriptions of his or her writing assignment with a partner and provides a bit of context for the assignment (introductory or upper-level course, large lecture or seminar,

etc.). I have chosen to use descriptions of writing assignments as the basis for the exercise because many teachers, regardless of their discipline, have an assignment (essay, paper, abstract, poster, lab notebook) that requires students to write. My instructions to participants would be to review the description and offer ideas on how to revise it to stimulate students to transfer their skills across time and among courses and/or disciplines (e.g., refer to writing done in their prerequisite courses or a first-year seminar).

This is a point in the workshop at which there is some flexibility with time and the degree of processing that may happen. If the experience level of participants is high, the exercise could end with pair discussion. Alternatively, individuals could share an item with the larger group of six. Participants have enough copies of their assignment descriptions for the group. A few ideas from the larger group could be collected if the overall prior experience of the group was limited.

Depending on the audience, there may be persons who do not use writing assignments, even those graded by teaching assistants. In this case, I would have several examples to provide. In some circumstances (e.g., a workshop for science faculty teaching large introductory courses), assuming that everyone has a writing assignment built into their course could be erroneous. In these cases, another class document (e.g., a course statement) could be used for the critique. The document being examined is less important than the mindset during the activity.

Directed Brainstorming

In my experience it is often easier to be creative with someone else's syllabus than my own, so I would ask people to pass a copy of the syllabus they brought with them to the person on their right and their left. This would give everyone two syllabi. After allowing participants a few minutes to become familiar with the syllabi, I would guide a brainstorming activity. One goal is to have participants practice transfer in yet another context. Another goal is to generate ideas that might spark the creativity of the person teaching the course. I would remind participants that brainstorming is about generating ideas, many of which will not lead anywhere. Judgment needs to be suspended for brainstorming to work well.

Although faculty may not feel they know enough to offer ideas in a field outside of their own, part of the goal is, in fact, to identify questions or topics that connect non-experts (students) to that field. Inspiration for some of the activities I do in my molecular genetics class have come from questions like these: How were people who died in the 9-11 attacks identified? What happens in a genetic counseling interview? An assign-

ment that requires students to explain a science topic to lawmakers and a case study about the genetics of color vision in primates were prompted by colleagues. For more than one of these, the time between when I encountered the idea and when I finally did something with it was years. I would tell participants that even if something seems far-fetched now, it may be useful later.

The questions for the directed brainstorming are as follows:

1. In what ways might the topic of the course connect to the lives of students?

2. What ideas do you have for "unusual" assignments?

3. What ideas do you have for a "case study" or use of examples?

Anticipating that participants may have difficulties understanding what I want them to do, I would obtain a few syllabi from the audience and demonstrate. For instance, I might get a syllabus for a Civil War history course from one person. I would share my brainstorming responses for how the topic might connect to students' lives: Why do people today still display the Confederate flag? Are there topics today that divide the U.S. population as deeply as slavery did? What roles did women play during the Civil War era? Are there similarities between the American Civil War and what happened in various countries during the Arab Spring?

If I received a syllabus for an African Art class, my responses to the first question might be these: Are the African masks available as home decorations on the American market true to their origin? What are the features I should look for that distinguish where in Africa the various styles originated? I've visited the American Southwest and have seen Native American rock art; do they have things in common with art found on African rocks? What are the features that distinguish African from Asian or European art?

I would do a similar demonstration for each of the next two questions. Brainstorming for unusual assignments given a syllabus in Physical Geology might generate the following. Can students watch videos of volcanic eruptions and *a priori* define stages. Could students play "20 Questions" to decide the geological history of a rock? Can students investigate the geology of their hometowns and report on them? Would it be useful to use this information to make a map representing the class? Could students design a theoretical expedition (e.g., the American Southwest or the Canadian Maritimes) that illustrates a collection of geological phenomena?

Ideas for case studies/examples in a poetry class might include using

the TED talks by Sarah Kay (http://www.ted.com/talks/sarah_kay_ if_i_should_have_a_daughter.html) and by Billy Collins (http://www. ted.com/talks/billy_collins_everyday_moments_caught_in_time.html); typing "poetry" and "case study" into Google; using Sappho as a case study; and considering the extent to which greeting card messages or lyrics in a song are poetry.

At the end of the brainstorming period, time would be provided for the authors of the syllabi to look over and talk about the ideas they received. I would then prompt people to consider the two or three ideas they generated during the previous personal reflection time and the ideas just generated in the brainstorming session and make a few notes to themselves. The goal here is to get participants focused on a single area to explore during the final segment of the workshop, in which participants redesign a feature of their course. This segment has a fair amount of flexibility it. If the workshop is running behind schedule, one of the three questions could be eliminated, or participants might exchange syllabi with only one person. Brainstorming can be used for other workshop content as well, for instance, incorporating technology, scaffolding assignments, or writing learning goals.

Another Opportunity for Reflection

At this point, I would check in with participants by asking them to rate their current emotional/intellectual state in response to the statements shown in Figure 5, using a scale of 1 to 5 (with 1 being low). I would prompt people to converse about their answers with other participants during a break period. This exercise has four goals: making explicit the difficulties people may be having; prompting metacognition; making an intellectual bridge to the next exercise, which involves analyzing the workshop itself; and emphasizing that the aptitudes needed for changing one's teaching are malleable and can be developed.

Identifying Examples Within the Design of the Workshop

After the break, I would collect comments/responses/questions from the larger group. These, in combination with what I might have overheard during the break, would inform how I approached the next activity. If the mood were predominantly enthused, I'd go directly to reflecting on how the structure of the workshop embedded the features we'd been discussing. If there were a significant level of frustration/ anxiety/resistance/questioning, I'd acknowledge that and relate my

Figure 5
Reflection on Emotional/Intellectual State

1. I am frustrated.

2. I have no idea how to use the ideas we just generated in my class.

3. I'm anxious about what the students will think if I try one of these ideas.

4. I am worried about how much time this will take to prepare.

5. I don't know what I'll have to give up in the class in order to add something.

6. This is going to create chaos in my class that I don't want to deal with.

own experiences in a brief story format, depending on the comments I was hearing. These might include the following: It is all right to start small; be transparent with students and tell them what you hope they get out of the new experience; provide students a mechanism (e.g., a two-minute anonymous paragraph at the end of class or SurveyMonkey) to give you feedback to help them buy into the goals and to help you make revisions; discuss how things went with a colleague (perhaps one in a teaching and learning center); remember that a certain amount of "chaos" can be invigorating. My instinct is to resist having groups of six enter into an extended discussion. First, it would be late in the afternoon and people would be prone to getting off track and/or just griping.

Second, I want to use the frustration points as introductions to the next activity. For instance, a response to "I'm not sure how to do this in my class" might be this: "How did this workshop encourage elaboration of ideas?" A response to "I worry about how students might feel" could be "What were the feelings that you had going through the various activities and how did I anticipate/deal with those?" Or, I could ask people to reflect on how I dealt with the "chaos" of allowing people to work on their own and in small groups.

This penultimate exercise involves identifying the aspects of the workshop that put the six features that promote transfer into practice. I would distribute a handout (see Figure 6) that had the activities of the workshop in the first column and ask persons to fill in the six features that promote transfer across the top. Groups would put a check mark in the boxes where an activity built on a feature.

Figure 6
Worksheet for Evaluating the Workshop

Enter the six features that promote transfer→							
Homework							
Quiz							
Individual reading							
Creating a poster							
Reflections (several)							
Critique writing assignment							
Directed brainstorming							
Reflect on Emotional/Intellectual State							
Review of workshop							

I anticipate that groups would identify the following (the features known to promote transfer are italicized).

• *Multiple and varied representations* **of concepts and tasks were used throughout the workshop, e.g., reading, note taking, discussion, reflection.** Participants critiqued an assignment, brainstormed ideas for a syllabus, and reflected on the workshop itself. There were chances to work alone, in small groups, and in larger groups.

• **There were abundant and varied opportunities for participants to** *engage in questioning and elaboration* **of the ideas for teaching to promote transfer.** People were asked to take notes on their reading, generate a poster in a group, critique a writing assignment, and discuss ideas from the brainstorming session. Several of the breaks also came after activities in which ideas had been generated, allowing participants to continue discussion.

• **Different activities provided** *intellectual challenge with support.* Using a reading rather than a lecture to convey the content allowed a novice to focus on only one or two features while someone with more experience could gain a richer understanding either through the reading and/or through informal leadership in the subsequent group discussion. The workshop was scaffolded to guide learning as it went from reading and checking comprehension to recognizing examples and finally to evaluating and creating. There was an opportunity for feedback (from self, peers, or facilitator) with every activity. Reflection and metacognition were prompted. My main roles were to guide and coach rather than instruct.

• **Obviously, participants encountered multiple** *examples.* They were asked to articulate examples from their previous experience, evaluate examples from others, generate ideas for someone else, and recognize examples in the moment. The final activity will be to generate ideas for their own courses.

• **A number of strategies were used to** *prime the motivation of learners.* The interactive and varied activities kept participants engaged (versus the more passive activity of listening). The content was also linked explicitly to faculty lives. A goal of the segment in which the possible barriers were legitimized was to emphasize that this type of creative intelligence can be developed with effort, time, and reflection. It isn't true that you either have it or you don't.

• **The numerous opportunities to** *practice content created as many opportunities for feedback.* **Feedback is often thought by novices to mean a graded assignment.** In the workshop, every activity was accompanied by some type of feedback, yet no assignments were graded. Self-reflection on performance compared to a reading or to peer performance and peer

appraisal were used. At several points, I provided my own interpretation against which participants could measure their understanding.

A Final Activity—Remaking One Class Day

In my own teaching, I fight against my predilection to save the synthesis of ideas for the last five minutes of class. I have addressed that in two ways in the workshop. First, the penultimate exercise, analyzing the workshop, is the one that gives the small group its chance to synthesize the material from the workshop. Second, participants have had several opportunities throughout the workshop to work toward the goal of reworking a day of their class. They have generated some ideas and have gotten feedback and more ideas from others. This means that the last activity has some flexibility built in if my estimations of time spent on the other segments have been in error. If I have overestimated the time activities will take, this final activity could be expanded, with people working on their own and then sharing what they have generated. On the other hand (and this seems more likely of me), if I have underestimated how long activities will take, 10 minutes of individual work should be enough for participants to gain a sense of closure (also see Figure 7).

Discussion and Conclusions

A variety of reasons have been proposed for why undergraduate faculty are slow to align their classrooms with what is known about learning (Henderson & Dancy, 2007), including lack of knowledge about recent findings in the field. Even when faculty do have the knowledge, they may be stymied about how to apply it. For this reason, it is crucial that faculty encounter sophisticated examples of teaching that involve more than lecture and discussion. I've argued elsewhere (Mulnix, 2012) that educational development specialists are in excellent positions to model such learner-centered environments.

I propose that a barrier to developing robust models for evidence-based instruction for faculty is that workshop facilitators themselves have not fully transferred what they know about learning to the context of faculty development. This may not be surprising, given that the learning sciences are a rapidly moving field. Additionally, many have come to professional development in midcareer from other academic backgrounds. While this gives them strengths, it typically means they have not received formal training in the learning sciences. A resulting lack of conceptual organization or appropriate depth and breadth

Figure 7
Draft of Workshop Schedule

8:00 – 8:30 a.m.	Introductions/discuss characteristics of the group/present learning goals
8:30 – 8:50 a.m.	Quiz
8:50 – 9:30 a.m.	Individual reading and reflection
9:30 – 10:15 a.m.	Creating a poster
10:15 – 10:45 a.m.	Circulating around posters
10:45 – 11:00 a.m.	Break
11:00 – 11:15 a.m.	Personal reflection
11:15 a.m. – 12:00 p.m.	Pair-wise sharing – critique assignment
12:00 – 1:00 p.m.	Lunch
1:00 – 2:15 p.m.	Directed brainstorming
2:15 – 2:30 p.m.	Reflect on emotional/intellectual state
2:30 – 2:45 p.m.	Break
2:45 – 3:30 p.m.	Review of workshop
3:30 – 4:00 p.m.	Remaking a day of class
4:00 – 4:15 p.m.	Summing up and evaluations

of knowledge limits their ability to transfer information effectively to other contexts. Additionally, teaching faculty who develop interests in educational reform and then go into professional development typically are grounded in disciplinary education publications that discuss learning in the context of students. Thus, they may not encounter prompts that trigger them to consider learning theory in the context of teaching faculty. Even those trained in the learning sciences have been reported to rely on traditional instructional methods (Halpern & Hakel, 2003).

I describe a workshop that integrates what is known about how to promote transfer of competencies into its design. I selected the topic of transfer in part because a body of experts had recently synthesized and parsed the research literature (see ELW) and because describing a workshop that covered this topic has the benefit of updating the reader on that recent work. However, my primary hope is that this example sparks ideas

for how learning principles can be applied in other academic development contexts. I have made some suggestions accordingly throughout my description. There are many other pedagogical strategies that may work as well.

The details for implementing such a workshop *should* be modified for a specific context (different content, targeted faculty audiences). My experiences during sabbatical have been at one and a half day workshops, indicating that there is a market for professional development opportunities of the length I have described. Indeed, spreading the workshop outlined here over 12 working hours rather than 8 would be beneficial. For instance, some of the sessions, e.g., poster construction or reflecting on the emotional/intellectual state, could be extended for a more relaxed and/or thorough approach. Additional time could be given for participants to revise their own course materials, and a session allowing for sharing these within the group could be added. I've already suggested above that time exploring and developing strategies for barriers to implementing change would be valuable. If the workshop were kept at a one-day length, leaders might elect to omit items (e.g., the quiz) to gain time in other areas.

As with any learning format that is structured this openly, surprises and diversions are likely to arise. Responding with flexibility is necessary for a successful learner-centered experience. One or more sessions (e.g., the quiz, the pair-wise sharing on a writing assignment description) could be omitted to alleviate time pressure in anticipation of these. Workshop leaders would make such decisions based on what they feel is a good learning pace for their audience and goals.

There is also the option of subdividing the workshop and running it over several successive sessions if the venues are on-campus. For instance, the first session might involve the reading, creation of the poster, and critique of a mock assignment. A second session could include brainstorming, remaking a day of class, and then evaluating the workshop as an example of teaching for transfer. If it were desirable to do a version of the workshop in a single short session, groups of six could be formed, each person could take responsibility for reading about one of the six features of teaching for transfer, and a poster could be made as the group members taught each other the content. A reflection on how this single activity was an example of teaching for transfer could be the debriefing summary for the session. It would even be possible to have six one-hour sessions, each devoted to a single evidence-based practice that promotes transfer.

The structure I have suggested allows for a great deal of flexibility without sacrificing the main messages. The keystone, I believe, is the evaluation of the workshop as an example of teaching for transfer. Retaining

this segment will help workshop leaders maintain their commitment to providing a robust model of a student-centered learning environment and help faculty maintain (or be introduced to) the practice of metacognition.

The instructional design of the proposed workshop is well supported by research. I've mainly justified my design choices using evidence-based learning principles, with a specific focus on teaching for transfer. Research in industrial and organizational psychology relating to workplace training also supports the model I propose. This evidence is briefly discussed in ELW and reviewed in Grossman and Salas (2011). Baldwin and Ford (1988) identified design of training modules as one of three categories that determine how successful training is transferred to the work environment (the other two categories are trainee characteristics and the work environment itself). Grossman and Salas conclude from a meta-analysis of the literature that three specific features of a training program consistently support transfer. "Behavior modeling" is a teaching strategy that clearly explains the desired outcomes, models those competencies, provides opportunities for practice, and offers feedback. In other words, a behavior modeling strategy shares many of the same features as teaching for transfer. The workshop I've suggested is an example of behavior modeling. "Error management," the second effective training strategy, helps workers anticipate potential issues of using the new knowledge and skills in the workplace and equips trainees to handle those. Although the session is brief and my primary motivation for including it is to make a transition to the next segment, the workshop I describe includes a chance for faculty to acknowledge constraining issues such as anxiety about being creative, loss of content coverage, or an unfavorable response by students to the changes. If the workshop were expanded to a second day, this would be a topic on which to spend more time. Particularly useful would be a session on how to persist in an environment that is not supportive of change. The third feature of effective training design identified by Grossman and Salas is a learning environment that mimics the real working environment. Using assignments, syllabi, and existing materials from a faculty's own course as the basis for practicing transfer provides this kind of authenticity.

In other work, Henderson et al. (2010) examined the literature and identified two continua that characterize change strategies in undergraduate STEM reform. One continuum describes the target of the change: individual to institution. The other describes a change approach: prescribed to emergent. Prescribed change assumes a predefined outcome based on an expert's knowledge, whereas emergent change assumes that those involved in the change participate in defining the outcomes. These two continua interact to give four categories of change strategies: developing

and disseminating materials (individual and prescribed), developing reflective teachers (individual and emergent), establishing policy (institution and prescribed), and developing shared vision (institution and emergent).

Henderson et al. (2010) found that the approach a research project took correlated with the professional identity of the researcher (STEM education researcher, faculty development researcher, or higher education researcher). For instance, 92% of the papers that had authors identified as STEM education researchers reported on change at the level of the individual. The majority (56%) develop and assess specific pedagogical approaches and are, thus, more prescriptive than emergent. Henderson et al. note that this approach to educational reform has had only marginal success; they point to two reasons. One reason is that the faculty meant to adopt the curriculum or pedagogical approach have little ownership and, thus, react negatively. The second is that the materials that are developed are specific to an environment and structure that may not be replicated elsewhere. Henderson et al. advocate that persons promoting change need to work more from an emergent perspective.

The workshop I have proposed relies heavily on a change approach that is emergent. Participants are assumed to have important contributions to make to interpreting and implementing research findings. The workshop's goal is to develop reflective teachers who can adapt what they are learning to their circumstances, not to prescribe a product. There is also an element of developing a community vision for classroom instruction. I believe that a coherent vision of what it means to translate research findings about learning to the undergraduate classroom does not yet exist. Part of the activity undertaken by the faculty groups of six is to create a framework that guides their emerging beliefs and behaviors; in this sense, the poster represents a shared vision. The lack of reliance on an expert to interpret and present research summaries and the emphasis on building a collaborative understanding based on the experiences and perspectives of the participants creates a richer, as well as an enriching, vision of what is possible in the classroom. In other words the workshop models a constructionist approach not only to learning, but also to reform.

Fairweather (2008) offers a similar opinion about STEM reform. He suggests that for those practices for which there is substantial evidence of effectiveness, efforts should be focused on adoption rather than on continued assessment. Teaching faculty about how learning occurs and facilitating the transfer of learning principles to their specific circumstances are ways to promote adoption.

Aligning classroom practice with what is known about how learning occurs at the undergraduate level is in its infancy. However, faculty de-

velopment specialists are missing an opportunity when they assume the role of expert disseminating content. Those responsible for professional development have large and exciting roles to play in continuing educational reform. This work can have a greater impact and accelerate change when professional development efforts themselves serve as evidence-based models for learning (also see Tagg, 2010). Faculty will develop more competencies when they are engaged rather than merely instructed during a workshop. They are more likely to develop into reflective teachers able to adapt ideas to their circumstances and persist in the face of difficulties. Furthermore, workshops built on the premise of learning principles can contribute to the development of a shared vision because the knowledge and experience of participants are sought and valued.

References

Baldwin T. T., & Ford, J. K. (1988). Transfer of training: A review and directions for future research. *Personnel Psychology, 41*, 63-105.

Brownell, S. E., & Tanner, K. D. (2012). Barriers to faculty pedagogical change: Lack of training, time, incentives and . . . tensions with professional identity? *Cell Biology Education, 11*, 339-346.

Ebert-May, D., Derting, T. L., Hodder, J., Momsen, J. L., Long, T. M., & Jardeleza, S. E. (2011). What we say is not what we do: Effective evaluation of faculty professional development programs. *Bioscience, 61*(7), 550-558.

Fairweather J. (2008, October). *Linking evidence and promising practices in science, technology, engineering, and mathematics (STEM) education: A status report*. Commissioned paper presented at NRC workshop on Evidence on Selected Promising Practices in Undergraduate Science, Technology, Engineering, and Mathematics (STEM) Education, Washington, DC.

Grossman, R., & Salas, E. (2011). The transfer of training: what really matters. *International Journal of Training and Development, 15*(2), 103-120.

Halpern, D. F., & Hakel, M. (2003). Applying the science of learning to the university and beyond: Teaching for long-term retention and transfer. *Change*, *35*(4), 36-41.

Henderson, C., & Dancy, M. H. (2007). Barriers to the use of research-based instruction strategies: The influence of both individual and situational characteristics. *Physics Education Research, 3*(2), 1-14.

Henderson, C., Finkelstein, N., & Beach A. (2010). Beyond dissemination in college science teaching: An introduction to four core change strategies. *Journal of College Science Teaching*, *39*(5), 18-25.

Mulnix, A. (2012). Using learning principles in faculty development workshops. *Cell Biology Education*, *11*(4), 335-336.

National Research Council. (2000). *How people learn: Brain, mind, experience and school* (Expanded ed.). Washington, DC: The National Academies Press.

National Research Council. (2012). *Education for life and work: Developing transferable knowledge and skills in the 21st century.* Washington, DC: The National Academies Press.

Tagg, J. (2010). Teachers as students: Changing the cognitive economy through professional development. *Journal on Centers for Teaching and Learning*, *2, 7-35.*

Wiggins, G., & McTighe. (2005). *Understanding by design* (Expanded 2nd ed.). Alexandria, VA: Pearson.

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