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'That's So Unfair!'

Students have strong opinions about fair and unfair practices in college courses. Previous research shows that, according to students, fair practices include clarity about grading procedures and course policies, flexibility in scheduling make-up exams and meetings, generosity with feedback, and a reasonable approach to workload in the course. If those policies and practices aren't followed, students often raise the issue of fairness, usually with some emotional intensity. "That grade is so unfair! I worked for hours on that assignment."

Perceptions of fairness, or classroom justice, as it's described in this recent research, relate to three aspects of the education experiences provided in courses. *Distributive justice* is defined as "perceptions of the fairness of an instructional outcome" (p. 323). Grades are the best example. *Procedural justice* involves the "fairness of the processes used to distribute resources or outcomes in the instructional context" (p. 323). Here, an example might be the way group work is graded, be it with individual grades, group grades, or some combination of the two. *Interactional justice* relates to the "fairness and quality of interpersonal treatment of students by instructors when procedures are implemented or outcomes allocated" (p. 323). Does the instructor show respect for students? Is the instructor open to student opinions? Does the instructor answer student questions?

Building on earlier research completed by some of this research team, this study investigated "the cognitive, affective and behavioral processes at play in students' perceptions of and responses to classroom injustice" (p. 324). Their almost 400 undergraduate student cohort at three different institutions responded to open-ended queries as well as survey questions.

The first question students answered asked them to recall and describe in detail a time when one of their teachers did something they considered unfair: What did the teacher do or say, and why was it unfair? Then students answered 30 questions regarding their emotional response to the unfair treatment and 40 questions that asked about their behavioral response to the event. Almost 55 percent of the unfair incidents involved procedural injustices, almost 30 percent were distributive injustices, and almost 17 percent were interactional.

The most common manifestation of instructor unfairness involved grades. The study indicates that "overall, more than half of the unfair behavior students identified concerned grades" (p. 336). It is important to note that these results report student perceptions of fairness. The grades they received in these situations may or may not have been the grades they deserved. In addition to feeling the grade itself was unfair, students described situations in which the grading procedures; the policies for make-up exams, missed deadlines, and attendance; the information provided about the exam; or the feedback were perceived to be unfair. In some cases, when students raised questions about a grade, the instructor made them feel stupid, which was also perceived as unjustified. A detailed table (p. 328) in the article contains examples of 543 injustices these students described, and it's an eye-opening list. Even though they were only asked to describe one, these students often described several different kinds of injustices related to the same event.

The strongest emotional response students had to a perceived injustice was anger. However, that wasn't the only emotion they experienced. Perceptions of unfairness resulted in feelings of helplessness, stress, disgust, and humiliation. As for the behaviors students identified as their responses, most often they dissented (complained) to others, such as classmates. The research team notes that talking to others gives students the chance to vent without fearing reprisals from the instructor. However, this response doesn't remedy the injustice or prevent it from happening again.

The actions students reported taking were both constructive and destructive. Some asked the instructor for advice on how to improve and others planned to disrupt the class. They reported changing how they approached the class (by studying harder, for example) or deciding that cheating in the course was

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In This Issue

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Talking Teaching with Colleagues Who Don't Know Your Content

Pete Burkholder, a history professor at Fairleigh Dickinson University, is writing a series of columns for a website on teaching U.S. history. He doesn't teach U.S. history, having only taken a course on it in high school. So it's not surprising that his first column addresses this apparent lack of qualifications. He's not qualified if this assumption holds: teaching and learning issues are specific, in this case, to the subfields of history. In other words, only those who teach U.S. history can talk meaningfully about teaching U.S. history with each other. Burkholder doesn't accept that assumption, in part, because he's responsible for the University's Teaching Development Program, which puts him in contact with faculty across a range of disciplines. He writes, "This experience has heavily emphasized to me how much we have in common in the realm of education, and how the walls separating our teaching fields are more self-imposed than real."

The argument that teaching every subject is unique just won't go away. Maybe that's because there's some truth to it. What's unique is the relationship between the kind of content being taught and the methods used to teach it. If the content is U.S. history, what a fellow U.S. history teacher can help with is providing examples that explain concepts, reading assignments that pique student interest, sequencing challenging content so students work up to understanding it, and so on. But what isn't unique are teaching methods, a host of concerns about student learning, and sometimes even the goals teachers are trying to accomplish.

Burkholder offers a great example of what appears to be a difference but really isn't. He was working with a group of scientists, and they did not understand how students could take history courses out of order, given that historical knowledge so obviously builds on and grows out of the past. "My response was that, although the specific content of our history courses differs, it's more the habits of mind that we seek to nurture." What's important are the historical thinking skills. The topic doesn't matter. It's those skills that are transferable, and they're taught in every history course, no matter when a student takes it.

But the scientists remained unconvinced. Burkholder then asked them about the periodic table and whether anyone present had memorized the elements. No, they hadn't, because that's not what those people interested in the periodic table need to understand. They need to know why it's arranged the way it is and the explanatory powers of that arrangement. That's what matters. Burkholder made the point. Those who teach history and science face the same overarching learning issue with students—teachers in both fields aspire to "more ambitious learning goals," those that transcend basic content knowledge. And this means that people who teach history and people who teach science can productively converse about how to move students beyond basic content knowledge to these larger and more significant learning goals.

Those who talk teaching across disciplines have productive dialogues about a wide range of shared interests and instructional challenges: getting more students to participate, making groups function more effectively, promoting academic integrity, responding to entitled students, and creating climates for learning in classrooms and online—and that's only the start of a much longer list.

Those who read publications like this aren't the faculty who need to be convinced that there's much to learn from those in other fields. It's the faculty member who's never looked beyond his

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Teaching Behaviors to Avoid

It makes more sense to focus on those teaching behaviors that help students learn, and that's where the emphasis has been for many years. The characteristics, features, aspects, dimensions, and behaviors of excellent teachers have been identified and explored since research on teaching in higher education first started. They are well known and widely touted in the literature, during workshops, and at conferences.

But as the research team below notes, "This approach begs an obvious but until now overlooked question: Are there qualities and behaviors that teachers should avoid?" (p. 331). That's an easy question for most teachers to answer. Yes, there are behaviors to avoid. We know because we've seen or experienced how certain behaviors get in the way of student learning.

But what we haven't had up until now is a list that clearly spells out poor teaching behaviors. And the list developed by this research team is notable in that what's on the list was put there by students—143 of them. They were asked to identify three descriptors of the qualities or traits that described bad teachers. From 319 different responses and additional student input on those responses, the researchers created a list of 15 qualities of ineffective teachers. Table 1 in the article contains all 15. The top five were in order: being disrespectful, unfair assessments of learning, unrealistic expectations for student learning, lack of knowledge of course content, and poor communication skills.

Even more useful than this first phase of the research was the second phase, during which students received the list of qualities and traits and were asked to identify specific behaviors that illustrate each quality. So for each of the 15 qualities in Table 1 (p. 332), a sample of behavior is also listed. For example, poor teachers don't provide feedback; sample behaviors include not going over graded exams, not returning or very slowly returning graded work, not updating information on blackboard or canvas, and not encouraging students to improve.

Poor teaching needs to be considered with several important caveats in mind. First, no teacher (or very, very few) are poor across all 15 of these categories. Yes, there are some very poor teachers who fall near the end of the continuum, just as there are some outstanding teachers at the other end. But the numbers at either end are small. For all teachers, the goal is the same: moving from wherever they are toward the excellent end of that continuum.

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Second, the quality of teaching varies from day to day, course to course, year to year. In other words, teachers aren't consistently good or bad; some place in between. Some days are better than others, as are some courses and some years. Most (but not all) teachers improve with age. We learn from experience, but instructional growth and development is not usually a straightforward, linear process.

Finally, who wants to be a poor teacher? Who wants to be thought of by students as one? Who wants to be thought of by colleagues that way? And who wants to be confronted with the fact that they may be a poor teacher? For that reason, it's easy to look at a list like this and quickly absolve oneself of any sort of guilt. "Why, of course, I don't teach irrelevant content." "I do care about my students." "If I'm inflexible, I have good reasons for being that way." That's why the list of behaviors identified in this research is so valuable. The tendencies are described as concrete, specific things teachers do that students give as reasons they are less ineffective. One of the examples of inflexibility is maintaining the class schedule no matter what . . . no matter whether students are overwhelmed with content, confused about and misunderstanding key points, or anxious and upset with the pace of the class. The inflexible teacher motors on. She has to. The content must be covered. It's not the teacher's problem if the students aren't learning it. Perhaps, but that's not how students interpret what's happening.

The list of behaviors associated with ineffective instruction can be a mirror held up to what any teacher does. It pays to take a look in the mirror. No teacher is going to see perfection. We all have our good and bad days. The list is a reminder that some things teachers do make learning harder. Knowing and facing what's on the list is part of what makes teachers good. —*MEW*

Reference: Busler, J., Kirk, C., Keeley, J., & Buskist, W. (2017). What constitutes poor teaching? A preliminary inquiry into the misbehaviors of not-so-good instructors. *Teaching of Psychology, 44*(4), 330–334.

Participation: Why Students Don't

It's hardly a new subject. There's plenty of research. There's lots of advice, suggestions, and possible strategies to try. But with all that, there's not much participation in a lot of courses. The percentage of students who don't participate has remained virtually the same for many years now. It's right around 50 percent in most studies (including the Kenney and Banerjee study referenced below).

Why is 50 percent not enough? Because those not talking do have ideas, information, and insights that could enrich discussion in the course. Because teachers need feedback on student levels of understanding, areas of confusion, and success in applying the content. Because students need to learn how to ask questions when they have them. And because the more students talk, the more likely they are to think about the content.

Why don't students participate? Again, the research, classroom experience of many teachers, and feedback from students themselves confirm a varied set of reasons. Participation is more challenging in a large course. It is harder to get recognized, but more important, it is harder to muster the courage it takes to speak in front of so many. Students fear speaking up, especially if they're unprepared; in that case, maybe they should be reluctant to voice their opinions. But feeling unprepared is often related to feeling that they do not understand, are confused, or simply don't know enough to even venture a guess. That's different than being unprepared, but it's easy to understand how the feelings might mingle and perpetuate the reluctance to participate.

The unwillingness to participate also involves the fear of disapproval, of looking foolish, of being wrong, or of making a mistake. Usually, students say first that they don't want to look foolish in front of peers and then add that they don't want to look unimpressive to the professor either. The various reasons students don't participate haven't been systematically analyzed or prioritized (as far as this editor knows), but this fear of disapproval is regularly mentioned. It was the reason students gave most when asked why they didn't participate in this study.

Teachers simply must do more to help students move beyond this fear of making mistakes. Mistakes are an inherent part of learning. Most of the time they promote more learning than when the answer is right. The need for a solid repertoire of constructive ways to respond to answers that are wrong or not very good is incumbent on teachers.

Of particular note in the Kenney and Banerjee study is another, albeit not frequently mentioned, reason students offered for not participating. It emerged in the survey results and from the focus group interviews. These students (at two different universities and in two very different courses) said they were not motivated to participate when teachers asked easy, obvious questions.

This finding bumps right up against advice regularly appearing in the literature—namely, that teachers should ask simple, straightforward questions, ones with right answers, especially at the beginning of class when students may need to be "warmed up" to participate. The students in the study said that simple questions made them feel as if the teacher was asking questions "reflexively and not taking the students seriously" (p. 71). In other words, the teacher appeared to be asking questions because he or she thought questions should be asked, not because of a genuine interest in discussing the topics with students. When they felt that way, students said they didn't believe the teacher would take what they had to say seriously, and so they didn't participate. Not all students in this study responded to easy questions this way, but some did, so it's wise to be aware of this possible negative reaction. If the instructor communicates genuine interest in the topic and is asking questions that he or she wants to hear answers to, then the students will be motivated to engage in discussion, according to the responses of the students questioned here.

An interesting inconsistency emerged in student responses. Asking them easy, obvious questions didn't motivate them to participate, but asking them opinion questions did. The reason given for liking opinion questions? They don't have right or wrong answers. But they don't want to be asked a lot of simple questions that usually do have obvious right answers. What the inconsistency underscores is the anxiety provoked by the possibility of being wrong or making a mistake.

Opinion questions come with their own set of challenges. If students are unprepared, haven't done the reading, or haven't regularly been in class, then their opinions aren't likely to contribute a lot to the discussion. Their opinions may be uninformed, logically inconsistent, or even unrelated to the topic at hand, but students still hold the belief that everyone is entitled to hear their opinion nevertheless. Teachers must constructively convey that quality is an issue when it comes to opinions. Not all opinions are equal, and informed ones generally score higher than those that aren't.

Research confirms what most teachers have experienced: when students do participate, it's usually not by asking a question. Teacher questions far outnumber student questions—as high as 96 percent in some studies. But there's another finding of interest in the research on participation (Edwards and Bowman, in this case). Student questions tend to mirror teacher questions. So if the teacher asks a lot of procedural, simple, recall-based questions, that's the kind of questions students will ask. But if the teacher asks more cognitive-level questions, students ask more of those questions as well. Questions play a key role in participation. As both of these

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studies indicate, they can be one of the many reasons students do or do not participate.

Participation has great potential. It can promote learning in those who contribute and those who listen. The goal is to find ways to realize that potential more regularly. —*MEW*

References: Kenney. J. L., & Banerjee, P. (2011). "Would someone say something, please?" Increasing student participation in college classrooms. *Journal on Excellence in College Teaching, 22*(4), 57–81.

Edwards, S., & Bowman. M. A. (1996). Promoting student learning through questioning: A study of classroom questions. *Journal on Excellence in College Teaching, 7*(2), 3–24.

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justified. In sum, the research team says that emotions drive students to behave primarily in ways that relieve their emotional discomfort and secondarily in ways that solve problems.

The emotional responses students experienced also involved some physical manifestations. They reported feeling sick or nervous or generally out of sorts about the whole event. Although those responses aren't really behaviors, the researchers considered them as such because they were part of the response.

When student reactions to the incident ended up as feelings of disgust, the most problematic responses followed. Students report being most motivated to take action at these times. They said they were more likely to be verbally aggressive and to complain to administrators (department heads, deans, etc.). "When students believe their instructors are unfair, they feel betrayed and violated, which can lead them to lash out by yelling at instructors, attacking their character, or reporting them to external parties" (p. 333).

There's no question that when students are dealing with what they perceive to be unfairness, that gets in the way of their learning. Given the importance placed on grades and the many pressures students face to get good ones, the fairness of those grades will continue to be a high priority for students. Faculty are advised to address the problem up front, with clear explanations of the grading procedures and the policies surrounding them. Good communication is key throughout the course, but especially when the inevitable occurs and a student angrily proclaims, "That's so unfair!" —*MEW*

Reference: Chory, R. M., Horan, S. M., & Houser, M. L. (2017). Justice in the higher education classroom: Students' perceptions of unfairness and responses to instructors. *Innovative Higher Education, 42*, 321–336.

Insights
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or her field. What's likely to persuade them to cast a wider net? Perhaps most compelling are the experiences of faculty who have learned and are learning from others—more testimonies buttressed with examples.

Is it important? Does it matter? If someone doesn't want to connect with others from outside the discipline, is that a problem? It's not so much a problem as a missed opportunity. No one discipline has a corner on pedagogical knowledge. Good ideas, creative approaches, unique strategies, and interesting research on teaching and learning can be found in every discipline. The world of pedagogical knowledge is so much bigger than any one field. And then there's the fact that some disciplines do better in some instructional areas than others. Those who are teaching students to speak a new language know how to constructively handle dreadfully wrong answers, and their techniques are applicable to all kinds of wrong answers. Those who teach physical education don't deal with students at desks. Their students are on the move and frequently playing games, which means those teachers have had to learn effective classroom management skills. Finally, instructional issues and agendas are more likely to be accomplished if they are collectively advanced.

It doesn't have to be one or the other. We can and should make use of the pedagogical knowledge being generated in our field. We can and should look for knowledge that exists beyond it. We need both, and that's something good teachers recognize. —*MEW*

Reference: Burkholder, P. A. (2017, September 14). Medievalist visits the Americanist teaching neighborhood. *Teaching United States History.* Retrieved from http://www.teachingushistory.co/author/peter-burkholder

Clicker Questions: Does It Matter What Kind?

The use of clickers, especially in large classes, has made participation a reality for a lot more students. It's a safe way to offer an answer and an equally constructive way to find out whether yours is the correct answer. Research on clickers and learning regularly documents their positive effects on exam scores. Now the research enterprise is moving to explore more specific questions, such as whether the clicker influence is more significant for some questions than for others. For example, here's a study that looked at the effects of factual and conceptual clicker questions on exam performance.

The research team had three hypotheses: (1) they expected to replicate previous findings that factual and conceptual clicker questions improve exam performance, especially the factual questions; (2) they anticipated that conceptual questions would improve performance on conceptual exam questions; and (3) they predicted that prior knowledge and their approach to learning would mediate the effects of clicker questions on learning.

They chose to study the effects of clicker questions in an actual classroom. In this case it was a biology course, taught didactically. The instructor lectured and used PowerPoint slides. The research team used four different conditions to test their hypotheses. They had students answer factual clicker questions; they had students answer conceptual clicker questions; they used enhanced control, in which the instructor didn't use a clicker question but verbally identified important content to know for the exams; and they used a simple control condition with no clicker question and no designation of the content as important.

The experiment ran across four semesters, which allowed researchers to assign each exam question to a different experimental condition. This permitted them to look at the "effects of the four conditions without the confounding variable of item differences affecting the results" (p. 48).

And what did the results show? They confirmed the first hypothesis. The factual clicker questions that students answered in class, for which they saw how everyone else answered and were given the correct answer, and which was discussed if less than 90 percent of the group got it correct, resulted in a statistically significant increase in correct factual question answers on the exams. Interestingly, and a bit surprisingly, the second hypothesis was not confirmed. Conceptual clicker questions used in the same way as the factual questions did not improve performance over the simple condition in which the instructor did nothing.

The third hypothesis was partially supported: "We found that clicker questions brought the overall exam performance of students who did not employ deep learning strategies to the level of their deep strategy-using peers" (p. 54). The use of clicker questions did not affect the other student variables studied: students' metacognitive self-regulation, active learning, shallow learning strategies and motivation, GPA, or prior knowledge.

A second study further explored the effects of clicker questions—this time in a physics course with an instructor who used a problem-oriented pedagogy. They predicted the same positive effect on factual questions and that "stronger, more knowledgeable students would score differently from their less well prepared counterparts, in response to the clicker intervention" (p. 54). The basic design of the study remained the same. However, in this case, the factual clicker question benefit on factual exam questions was not realized, nor was there any benefit on the conceptual questions. The researchers concluded, "The present study replicates many prior reports of clicker use, which demonstrated that the technology is effective for supporting factual knowledge retention in lecture-based classrooms, but also demonstrated that the effect does not always generalize to courses employing active learning strategies" (p. 56).

There was another finding of note in the second study: "Students in the problem-oriented course with little or no prior knowledge of the material suffered more from the negative effects of the factual clicker questions and enhanced control condition on the conceptual exam questions" (p. 56). The researchers wondered whether calling attention to the importance of content with either a clicker question or the instructor's identification of it as important content caused these students to focus on the content but only in superficial ways. They were motivated to memorize it because it was important to do so, but they memorized without understanding it. For all students in the study, the researchers think their testing of an "enhanced condition" where the instructor has called attention to the importance of the content "suggests that the reason behind clicker effects, or at least a part of the reason, is that they may alert students to important information and thus lead students to focus more on that information, either in class or during study" (p. 56).

This is good work. It moves our understanding of clicker effects forward and shows that they don't just work, but work differentially depending on the type of clicker question, the instructional approach, and a collection of variables related to students. —*MEW*

Reference: Shapiro, A. M., Sims-Knight, J., O'Rielly, G. V., Capaldo, P., Pedlow, T., Gordon, L., & Monteiro, K. (2017). Clicker can promote fact retention but impede conceptual understanding: The effect of the interaction between clicker use and pedagogy on learning. *Computers & Education,* 111, 44–59.

Organizing a Day, a Week, a Life

Early in my teaching career, I attended a professional development event. The only session I remember was one given by Alan Lakein. It featured his book *How to Get Control of Your Time and Your Life.* He proposed an elaborate scheme for making and prioritizing to-do lists. I don't remember most of the details, but making a daily list of things to do became a regular feature of my professional and personal life. A short piece in *College Teaching* and an interview, both on checklists, got me thinking about time management and how we use and don't use the time we have.

Catherine Anderson points out that our 18-year-old beginning students "experience unprecedented autonomy in deciding how to spend their time" (p. 210). And many of them end up not doing a very good job of managing it. Sometimes we forget that time management is also a skill, one that can be learned and one that is directly related to effective study routines. Truth be told, until I heard Lakein, I hadn't ever thought of making a plan for the day, and by that point, I'd been in school many years.

Organization is not a strong suit for many of us. I frequently claim that in my next life I plan to be "organized, thin, and driving a race car." So what I'm proposing here isn't a thinly veiled attempt to get the disorganized among us organized. It's about what teachers need to do to help students learn and be successful in college and in life.

Atul Gawande, a surgeon who writes beautifully, has a book, *The Checklist Manifesto: How to Get Things Right,* in which he traces the history of checklists and their role in adding accuracy to complex tasks that must be completed routinely, such as preparing planes for takeoff. Gawande worked with various health professionals to create surgery checklists and has evidence to show that using them results in a significant decrease in operating room errors. The point here is that what checklists can accomplish is not trivial.

Anderson uses them in a large introductory linguistics course. She posts one at the beginning of every week, such as "Week 3: What to do this week." They're detailed, with due dates, time windows, and boxes to check off an item when it's completed. A whopping 78 percent of her 600-odd students reported they checked off at least some items (20 percent said they used the checklists consistently), and the same 78 percent rated them as helpful. In fact, they were the highest-rated item on a list of course elements.

Requiring completion of a set of checklists or submission of daily to-do lists isn't the recommended approach here. An approach more likely to engender a positive response from students starts with modeling—simply posting them on the LMS, as Anderson does, with the advice that the checklists are there to keep students on track with what's happening in the course. I can imagine each class session beginning with a to-do list: "Here's what we need to get accomplished in class today." Or maybe before the first exam, a study checklist could include what to study, when, and for how long.

The point here is that what checklists can accomplish is not trivial.

In my first-year seminar, I used to have students submit a game plan that described preparation schemes for the first exam. I was always surprised by how many students said they'd never done that before, and then I was dismayed with how few of them executed their plans. But scores on the first exam were almost always disappointing, which provided an opportunity to suggest that they might try following their game plan next time and seeing whether it made a difference. I was pleased by the number who reported they did and saw their scores go up. I can't say for sure that following the plan helped, because there are other variables here, but I rather suspect it at least helped.

So that's the case for taking time to help students, especially beginning ones but also more advanced ones, facing complicated and challenging assignments to develop the time management and planning skills that will improve their performance on the assignment, on the exam, in the course, and in the degree program and for the rest of their lives. —*MEW*

Reference: Anderson, C. (2017). Checklists: A simple tool to help students stay organized and motivated. *College Teaching, 65*(4), 209–210.

Gawande, A. (2009). *The Checklist Manifesto: How to get things right.* New York, NY: Henry Holt and Company.

Using Retrieval Cues on Tests

Tests cause most students considerable anxiety. That's good, because it usually motivates them to study. However, when it's time to take the exam, excessive anxiety can compromise how students perform. They miss questions that they knew the answer to, or so they tell us. We listen skeptically, but in some cases what students report is true. High anxiety makes it hard to focus on exam questions. Kristel Gallagher explains that the problem is made worse when they have trouble retrieving the information needed for the answer.

Gallagher, a psychologist, explains that when you're thinking about what needs to be learned, the process of acquiring and encoding the information is emphasized. Then we assume that if you've gotten the information encoded and stored it in memory, the hard part is done. "Retrieval should be the easy part. The information is there. It just needs to get out" (p. 165). But that assumption is wrong. Encoding, storage, and retrieval are three separate parts of the learning process. Retrieval involves reconstructing the knowledge. Unless the information has been memorized, word for word, when it's located and retrieved, learners re-form the words used to describe what's there in memory. That process of reconstructing takes up a good deal of the actual learning.

Retrieval cues play an important role in that reconstruction: "Effective retrieval cues are those that help people reconstruct accurate information for the given situation—they guide you in sifting through the storage container and piecing together the necessary details" (p. 165). Gallagher got interested in the possibility of embedding retrieval cues in test questions. Would they guide students to the information they'd encoded and help them retrieve what they needed to answer the question?

Research has shown that the most effective retrieval cues are those that tighten and narrow the sifting process. Gallagher illustrates how that works. For the exam, her students need to learn what "stimulus generalization" means. She explains the concept and then uses her two cats, Lilo and Stitch, to show how it works. They've learned to fear a Windex bottle because a squirt of water has been used to train them. Students could associate the concept with the chapter in their text on "Learning," specifically the chapter section on "Classical Conditioning," where it's explained, but the specificity of the cats' names provides that narrower focus needed to expedite the retrieval process.

Research has shown that the most effective retrieval cues are those that tighten and narrow the sifting process.

Gallagher tested her retrieval cue hypothesis in two courses, a lower and upper division psychology course. On an exam in each of the courses, retrieval cues were embedded in some of the exam questions taken by some of the students. The same questions minus the retrieval cues appeared on the exams taken by the other students. In both cases, the presence of the retrieval cues makes a statistically significant difference in scores on those questions: 95.2 percent (SD = 5.02 percent) with the cues and 82.3 percent (SD = 15.8 percent) without them in the upper division course and 81 percent (SD = 18 percent) with the cues and 75. 6 percent (SD = 19.8 percent) with them in the lower division course.

But did the presence of the retrieval cues make the questions too easy? Did they water down the rigor of the exam? Gallagher says they did not. She uses exam questions to illustrate. Here's one: "Under which of the following conditions will groups tend to make better decisions than individuals (such as estimating the number of Skittles in a jar)?" She explains, "If the student has never encoded or stored the information required to answer the question, a retrieval cue will do nothing more than force the student to spend more time reading the question" (p. 169).

In addition to improving exam scores, experience with retrieval cues gives students an important study strategy that they can use in other courses and after college. To be effective, retrieval cues do not need to come from the teacher. In fact, some research supports the idea that the retrieval cues learners make for themselves are more memorable than those the teacher provides. "The simple fact of having students generate their own retrieval cues forces them to actively engage with material and encourages deeper processing of the information" (p. 169). —*MEW*

Reference: Gallagher, K. M. (2017). Retrieval cues on tests: A strategy for helping students overcome retrieval failure. *College Teaching, 65*(4), 164–171.