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Teaching Squares: A Teaching Development Tool

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I regularly hear colleagues complaining that they never have time to discuss teaching, and I know this is true in my liberal arts and sciences campus at this large research university. We devote so much of our time to teaching students, preparing classes, grading student work, and doing research that there's little time left to compare notes with our colleagues, even those next door. On those rare occasions when we do, it's often a pleasant surprise. Interesting teaching strategies are being implemented all around us. When this happens to me I often think, "I wish I could come see how you do that!"

What we don't seem to have are structures that facilitate these conversations and observations. Technology now makes possible international asynchronous conversations such as those on the Teaching Professor Blog. But we also need something that facilitates local, face-to-face conversations with others at our institution. At the Augustana Campus of the University of Alberta, I think we have found a solution: teaching squares.

Teaching squares build the instructional abilities of teaching faculty. They were first developed by Anne Wesley at St. Louis Community College and have been used by many North American universities and colleges. We introduced them here at the Augustana Campus in 2009, and they've been running during most terms since.

A teaching square consists of four faculty from different disciplines who visit each other's classes within a two-to-three-week period. After the classroom visits, the four gather around coffee or a meal to discuss the teaching observed. The intention of the square is not to criticize each other's teaching. Rather, it's an opportunity for faculty to reflect on their own teaching in light of colleagues' teaching examples. Could I do something like that? Would that approach work with the content I teach? I might be able to use that, but what would I need to change so that it better fits with my teaching style? Are my students ready for a strategy like that? It's a constructive way to confront current teaching practices in light of some potential alternatives.

While I was associate dean of teaching from 2010 to 2013, the feedback I received from faculty who participated in the activity was positive. What they said was most helpful was simply having a structure that included time for discussion of teaching-related issues. Their exchanges usually started off with what they'd observed in each other's classes but often segued into analysis of the issues being faced by all of them in their courses.

The views of those who teach different kinds of content can be very helpful in providing new perspectives on the content being taught. In 2011, the University of Alberta's Festival of Teaching included a program where faculty could visit different classes that had been opened for the festival. We had positive feedback about the opportunity to observe different teaching styles and strategies, but we also got constructive criticism that a valuable component was missing—the reflective conversation that typically follows in a formal teaching squares program. It's not always easy to schedule the four faculty needed for a square, but it's definitely worth the effort, given the value of these follow-up discussions.

Some participants have told us that they'd like to get evaluative feedback on their teaching. In the spirit of a teaching square, however, this cannot be one of its goals. The discussion of teaching needs to be free of evaluation and judgment. When exchanges become critical and personal, they can produce defensiveness and suspicion, and that would inhibit the open exchange of ideas and the free sharing of teaching strategies.

We continue to use teaching squares as part of our faculty development program at Augustana. I recommend the structure. If you can round up four colleagues, you can do a square on your own, or it might be something you could recommend to your teaching center or faculty development program.

In This Issue

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Teaching Creativity

The ability to be creative is valuable in any profession. But is it something that can be taught? Are we doing anything to cultivate students' creativity? If so, what?

An analysis of how creativity was being taught in seven engineering courses offers interesting insights and marks a good place to start thinking about the role of creativity in education. The study authors reference a variety of definitions for creativity, including one that describes it as "a type of novel thinking, where people redefine problems, see gaps in knowledge, generate ideas, analyze ideas and take reasonable risks in idea development." (p. 418) Their analysis of creativity is structured around four "cognitive operations that underlie the creative process as a whole." (p. 419) These four were identified by another group of researchers.

- **Generating ideas**—also referred to as divergent thinking
- **Digging deeper into ideas**—described as convergent thinking
- **Openness and courage to explore ideas**—involving specific personal characteristics
- **Listening to one's inner voice**—identified as reflection or metacognition

Data generated by interviews of the professors teaching these seven courses and a small sample of students taking them revealed that the convergent-thinking component of creativity was "well represented" in these courses. Teachers were encouraging students to dig deeper into ideas. However, there was much less evidence of idea generation and openness to exploring ideas. And although there was some evidence that teachers were trying to teach creativity, assessing students' creative abilities was lacking.

This is not the kind of research from which generalizations can be drawn, but the findings are not unexpected and likely are true of more than just engineering courses. Despite the importance and value of creativity, it's not something most teachers make a conscious effort to teach and not something that's assessed in any systematic, objective way in most courses. We tend to think of creativity as something that just happens, not as a skill that can be developed or a process that involves clearly defined steps.

A particularly useful part of this research is the interview questions the researchers asked teachers and students. The questions for teachers can be used to prompt thinking about what we currently do or could be doing to develop creativity in our students. And those asked of students can encourage their thinking about creativity. Here's a slightly edited sample from both question sets (pp. 422-423).

Questions for faculty:

- **Can you describe ... a situation that would demonstrate that a student is engaged in a successful creative process in your course? What are key components in a successful creative process?**
- **When students leave your course, what do you want them to know about the creative process?**
- **How do you know if students are successful in improving their creative process skills?**

Questions for students:

- **What do you think your instructor wanted you to learn about creative processes?**
- **Can you identify a specific experience in class where you think your creative process skills improved?**
- **How did the instructor teach about creative processes?**
- **In what ways did your instructor give feedback on your creative process skills development?**

Reference: Daly, S. R., Mosyjowski, E. A., and Seifert, C. M. (2014). Teaching creativity in engineering courses. *Journal of Engineering Education, 103* (3), 417-449.

New Ideas about an Old Teaching Tool

"Syllabi have been fundamental to how we manage our courses, yet they have been the subject of little innovation." That's what prompted authors Charles Fornaciari and Kathy Lund Dean to revisit this instructional standby. "We build on work that examines how student information processing norms and changing expectations with respect to teaching and learning have fundamentally shifted. ... This body of research makes a compelling case that we have the opportunity to change the way we use syllabi before we risk its role being considered increasingly irrelevant." (p. 702)

Students don't read the syllabus, which faculty say is the reason they must cover it in detail on the first day of class. And even though students aren't reading the syllabus, most syllabi have gotten longer and even more detailed. Faculty now use the syllabus to clarify their expectations and to delineate various course policies. They see this as protection against student claims that they didn't know or weren't told about them.

Fornaciari and Lund Dean use the principles of andragogy (a word used to describe educational practices for adults) as premises for their exploration of syllabi roles and purposes. Andragogy, which is juxtaposed with pedagogy (teaching in ways appropriate for children), vets instructional practices on these six principles: (1) adults need to know why they are being asked to learn something; (2) they learn through trial and error; (3) they want to own the decisions they make about learning; (4) they want to learn what is immediately relevant to their lives; (5) they like learning that solves problems as opposed to just learning content; and (6) for them, intrinsic motivation trumps extrinsic motivation.

A lot has been written about the syllabus, but as these authors point out, almost all of it focuses on "the nuts and bolts of crafting a course syllabus." It's literature that helps "the instructor anticipate student information needed to begin the course." (p. 703) Not receiving much focus in the literature are four larger frames Fornaciari and Lund Dean believe orient how faculty think about and use syllabi. Here's a summary of what they write about each of these.

Syllabus as contract—"Contractual syllabi are often long, defensive and designed to close policy loopholes." (p. 706) The language in these syllabi is generally directive and defensive and sometimes as legalistic as that found in actual contracts. "Contractual and policy-oriented language stifles effective learning and dishonors student differences." (p. 706) These are not syllabi that motivate students or create excitement about the course.

Syllabus as power instrument—"Syllabus as power means that by following its policies and requirements, classroom events are controlled as closely as possible by the instructor." (p. 707) The message of these syllabi is clear: the teacher has made all the important decisions in this course, none of them are negotiable, and it's the teacher who is the focus of the course.

Syllabus as communication or signaling device—"Understanding the syllabus as [a] communication/signaling vehicle means acknowledging that we send powerful expectations about what we and the course will be like. ..." (p. 708) The authors offer some specific examples. What's conveyed to students if the agenda for day one is to "go over" the syllabus and then let students out early? What role does the syllabus play if it's covered in detail at the beginning of the course and then never mentioned unless somebody violates one of the policies? How much space is devoted to course policies versus space that describes what students will know and be able to do when the course is over? Does the syllabus identify resources that can help students master the materials and skills of the course?

Syllabus as collaboration—With this frame, the syllabus or parts of it are cocreated by the instructor and the students. The process motivates students and facilitates greater ownership of learning. The authors note that for beginning students this can a confusing experience and not one they are prepared to handle.

The authors argue that these last two frames "hold the most promise for matching teaching and learning with andragogical and student-centered learning." (p. 705) Perhaps the most useful and interesting part of the article is an extended table that lists examples of how syllabi might be changed to reflect the more andragogical approach. Here's one, first as originally used and then in revised form.

"I do not maintain a lecture format and I expect full participation from you. I have prepared an interactive course. Thus, reading and preparing before class is critical." (p. 714)

"As partners in learning, we each have responsibilities for every class period. I have prepared an interactive and engaging set of activities for which your reading and pre-class preparation is critical." (p. 714)

And the authors note that if you want to be even more collaborative, you could describe how the course will be conducted.

"From a list of acceptable readings, we decide together which will most contribute toward learning deemed most vital for that particular section of students. We negotiate common pre-class preparation behaviors suitable for our needs." (p. 714)

Most of us use syllabi in every course. It's easy for our use of them to become routine. An excellent piece of scholarship such as this calls us to examine what we are doing and why.

Reference: Fornaciari, C. J., and Lund Dean, K. (2014). The 21st century syllabus: From pedagogy to andragogy. *Journal of Management Education, 38* (5), 701-723.

Creating Global Moments in Local Classrooms

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Over the past four decades, there has been a significant increase in the number of non-native, English-speaking students enrolled in our colleges and universities. Creating global learning environments has become an important goal for many institutions. Faculty are being encouraged to create environments conducive to learning for both native speakers and non-native speakers. They can cultivate those environments by designing course assignments and class activities that use the strengths of native and non-native speakers and that address their challenges.

To illustrate how that might work, consider these three assignment prompts:

- Watch the Super Bowl and discuss its influence on American culture.
- Compare David Letterman's and Conan O'Brien's talk shows.
- Listen to the State of the Union Address by the president and critique his economic vision.

Cultural assumptions are embedded in each of these prompts. International students can be engaged in the assignments in a more meaningful way if they are asked to examine the influence of the most popular sports game in their home countries, compare a well-known talk show in their country with one in the U.S., and critique the economic vision of the presidents of their home countries. This allows international students to help create global moments in the classroom by introducing their own cultures and customs to the rest of the students. It is important to remember that international students are valuable assets when it comes to preventing classroom activities, assignments, and projects from being ethnocentric.

When faculty design a group project, international students along with some of the other students can take an active role in the research process, while native, English-speaking students can be more active in writing the paper. Native speakers become language informants and non-native speakers become cultural informants for their group project.

If it is a speaking assignment, faculty may want to pair an ESL student with a native speaker. The ESL student becomes the discussant for a native, English-speaking presenter. The ESL student can read and provide feedback on the native speaker's presentation

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Can Students Accurately Assess Their Work?

Not if grades are involved, would be the likely answer of most faculty. The need for good grades does cloud student objectivity. But what that doesn't change is the fact that the ability to accurately assess your work contributes much to learning experiences in college and it's a virtual necessity in professional life. David Boud (and two coauthors) report that it's not a skill that's taught explicitly in most curricular programs. Rather, it's something we assume students pick up on their own and without instruction.

Considerable research has been done on self-assessment (much of it completed by Boud, who has spent much of his career working in this area). He explains that not only do we fail to teach self-assessment skills but also "The capacity to make judgments is not well represented in many current assessment practices. Assessment items are often strongly knowledge-based, with criteria unilaterally set by teachers. The role of students tends to be to offer themselves to be assessed by others." (p. 942) In general, education encourages students to depend on the judgments of others. They come to believe there's no need to assess their own work. Others will do that for them.

Moreover, good self-assessment skills don't develop quickly with one or two opportunities to try doing it. "We assume that the key feature of the development of judgment, like any other kind of expertise, is that it requires consistent engagement over time." (p. 943) That makes sense given the complexity of the skills involved. Boud and his coauthors say those skills develop when students consistently make judgments guided by explicit criteria. Then their assessments must be compared with those given by others, either by experts, such as teachers, or by peers. Students must explore the reasons their self-assessments are not the same as those given by others. What are the reasons behind their incorrect assessments? What did they miss that others saw?

Out of these background issues emerged the four questions explored in this study: (1) Do the grades students give themselves agree with teacher assessments? (2) Do the differences between self-assessments and those given by others decrease as students do more self-assessment? (3) Does the overall performance of a student affect his or her ability to self-assess? and (4) Does the ability to accurately self-assess lead to improved performance?

The research team had an interesting opportunity to explore these questions in the context of an undergraduate degree program in design offered at an Australian university. A software program called ReView gave students criteria-based feedback and comments. It included a self-assessment option. Students could

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Helping Students Discover How to Omit Needless Words

By William Palmer, Alma College, MI
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When students have completed what they think is the final draft of an essay, I find it useful to do the following editing activity. I don't tell students what we are about to do. I want them to discover the process of omitting needless words. Here are the steps I use, which you are welcome to use or adapt.

1. Dictate two sentences, which students write down in their notebooks. I prefer having students discover the words as I say them rather than seeing the completed sentence, say, on a PowerPoint.

   Personally I feel that both men and women are equally guilty of gossiping. The point that I wish to make is essentially that people learn best what they teach others.

2. After students transcribe the sentences, ask them to count the number of words in each sentence: 13 and 17.
3. Ask "Is there a problem with these sentences?" Someone will likely say the sentences are too wordy. Yes.
4. Then ask students to cross out needless words and count the number of words in their revision. Ask some students to share their revisions with the class. Some sentences will still be wordy. Keep pushing for the most concise versions possible. Here are two examples:

   Both men and women gossip. (5)
   People learn best by teaching others. (6)

5. Briefly discuss the revisions, especially how redundant it is to write "Personally I feel." You can comment that students usually don't need to write "I feel" or "I think." Readers will know from the sentence that's what the writer "feels" or "thinks."
6. Ask students to write down the lesson in capital letters beneath their examples: "OMIT NEEDLESS WORDS" (which comes from Strunk and White's *Elements of Style*).
7. Last—and most important—have students apply this editing tool to their own papers. Tell them to go through their essay and cross out needless words (which often involves rewriting some sentences). Heads lowered in concentration, students will do this. It helps to tell students that you aren't asking them to omit specific details—only needless words. You can roam around the class helping students.

It's important to reinforce this editing activity throughout the term so it becomes a habit. Whenever students have a second or third draft of a paper, you can dictate a wordy sentence or two for them to transcribe and edit. Then have students edit their own writing, omitting needless words.

Students Assess?

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use assignment criteria (samples are included in the article) to assess their work (which included group projects, research reports, oral presentations, critical and reflective essays, and individual portfolios). They could then submit their assessment and see the teacher's evaluation of their work. The teacher graded the student's work without seeing how the student assessed it. Use of this self-assessment component was voluntary, but the study looked at its use across individual courses as well as across various courses within the program. For the study, they looked at almost 2,200 self-assessments from 182 students.

In the results, they found significant disagreement between teacher and student self-assessments on first tasks, with students often rating themselves higher than the teacher did. But those differences diminished as students completed more self-assessments. Here's how researchers describe these results. "Although students may initially struggle to accurately self-assess, with time and benchmark scores from their tutor [think teacher], they appear to get more accurate." (p. 950) The same increase in accuracy was seen within a course and across several of them. However, when students started a new course, their first self-assessments were always less accurate than subsequent ones.

Academic achievement levels (measured by grades received on these assignments) did make a difference. Consistent with previous research, low-achieving students overestimated their performance and high achievers underestimated theirs. But it was the group in the middle that "[was] the most able of the three groups in developing self-assessment skills in this context." (p. 951) The difficulty of those low achievers persisted when researchers grouped the students by whether they were accurate estimators, underestimators, or overestimators. "Over estimators, who tend to be poor achievers, do not appear to learn how to improve their performance over time." (p. 951) "It may be that this group is content to merely pass each task and has no desire to invest the effort to do better, or they may not have the capability to improve without additional educational interventions." (p. 952)

"Notwithstanding that this is an initial study with incomplete data biased towards students enthusiastic in seeking to judge their own performance, there are interesting pointers to phenomenon that if confirmed would have quite substantial pedagogic implications." (p. 954)

Reference: Boud, D., Lawson, R., and Thompson, D.G. (2013). Does student engagement in self-assessment calibrate their judgment over time? *Assessment & Evaluation in Higher Education, 38* (8), 941-956.

How Course Structure Promotes Learning

It is time to get beyond asking whether active learning works. We know it does, most of us have seen it firsthand, and those who haven't would be hard-pressed to argue against the still accumulating mountain of evidence. What we need now are answers to more focused questions, a more nuanced understanding of how and for whom particular strategies work. We also need to know the extent to which active learning strategies are transferrable. Biology faculty researchers Sarah Eddy and Kelly Hogan conducted this kind of exploration. They were interested in finding out whether earlier findings supportive of increasing course structure garnered the same results when the intervention was used by a different instructor at a different institution with a different student population. They also wondered whether increasing course structure affected different student populations to different degrees and whether those different student groups changed their course behaviors and perceptions in the same or different ways.

Based on earlier research, here's how this team defined and implemented course structure in the six terms of a large (almost 400 students) general introduction to biology course taken by a mixed majors population. The same instructor taught all six sections. The low-structure courses were basically traditional lectures with a minimal amount of student interaction. Students had three homework assignments that helped them prepare for three exams and one final. In the three moderate-structure courses, students were given sets of ungraded, instructor-prepared questions they used to guide their textbook reading before class. They also completed online graded homework associated with the reading, and about one-third of class time was devoted to activities, including group work and answering exam-type questions. Answers to these questions were not graded, but students could earn one to two percentage points for completing a specified number of them.

And what did they learn about the impact of these interventions on students' academic achievement? "We found that transforming a classroom from low to moderate structure increased the exam performance of all students by 3.2%, and black students experienced an additional 3.1% increase, and first generation students experienced an addition 2.5% relative to continuing generation students." (p. 463) And failure rates also decreased. In the moderate-structure sections, they dropped from 26.6 percent to 15.6 percent, a 41.3 percent reduction. In the earlier study using the same structural interventions, a similar decline in failure rates was also reported. Of this finding the researchers write, "Students come from a range of different educational, cultural, and historical backgrounds and face different challenges in the classroom. It is not surprising that in the face of this diversity, one intervention type does not fit all students equally." (p. 463)

In an effort to better understand why and how this intervention works, researchers surveyed students, asking them for information about their course-related behaviors and perceptions. The researchers predicted that more course structure would increase the amount of time students devoted to study during the week. They also thought that more structure would change the culture of the classroom, evidenced by more participation, increased study with others outside class, and a greater sense among students that they knew others in the class. And finally they anticipated that these assignments and activities would increase how much value students placed on the course and the skills (such as higher-order thinking) it purported to develop.

The results related to students' behaviors, and perceptions were mixed. In the low-structure sections, students reported studying on average between one and three hours a week. The amount of study time reported by students in the moderate-structure sections jumped to an average of between four and seven hours. Those in the moderate-structure sections were twice as likely to come to class having done the assigned reading, and they saw those preparatory assignments as equally important as the lectures to their learning.

Some evidence that greater course structure increased the sense of community in the course was also found. In the moderate-structure sections, students were two times more likely to view the class as a community and 2.4 times more likely to say students in the class knew each other. However, students did not collaborate more with each other outside class, nor did they participate more at statistically significant levels in the moderate-structure sections.

And finally, students in the moderate-structure sections did not find the course to be more valuable than students in the low-structure sections. They didn't value the skills they were learning more, they reported memorizing about the same amount of material, and attendance in the moderate-structure sections was not significantly higher than in the low-structure sections. "The attendance result was surprising to us, because increased attendance has been shown to be a common result of making a classroom more active." (p. 465) However, in some of these previous studies, points were awarded for attendance, but they were not in this course.

The questions about active learning asked in this study are focused, and the answers do deepen our understanding of one set of interventions designed to make students' learning more active. This is the kind of research that moves us from a more generic to a specific understanding of how active learning works.

Reference: Eddy, S. L., and Hogan, K. A. (2014). Getting under the hood: How and for whom does increasing course structure work? *Cell Biology Education—Life Sciences Education, 13* (Fall), 453-468.

Using Quizzes to Improve Students' Learning

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In an instructional experiment, I split students into three groups—no quiz, announced quiz, and pop quiz. I used the same instructional style and teaching materials (including the same textbook and handouts) with each of these three groups. I also gave the same two midterms and final exam to each group. There were no mandatory attendance policies or bonuses for attendance. The announced-quiz group took 10 quizzes, each worth 2.5 percent of the course grade. The dates for these quizzes and the material they covered were listed on the syllabus. Students took these quizzes at the beginning of the class. Those absent were not allowed to make up the quiz, late students got no extra time, and late students were not allowed to complete the quiz if they arrived after students had taken it.

For the pop-quiz group, neither the schedule nor material covered on each quiz was provided on the syllabus. Students did not know how many quizzes were being given or when they were scheduled. They took their quizzes at the end of the period and, like the previous group, they had 10 quizzes, each worth 2.5 percent of the course grade. These quizzes tested students on the material covered that day in lecture. The same rules applied—no makeup quizzes for those absent or leaving early. I used different types of questions on the quizzes, including problems and short essays.

I conducted a survey and used statistics to investigate whether quizzes (pop quizzes or announced quizzes) improve students' exam performance and enhance their investment in in-classroom effort (i.e., attendance/participation) or out-of-classroom preparation. I also examined whether these different quiz types serve different instructional purposes in students' learning.

Here's what I found.

(1) Student effort in class and out of class was higher, and they performed better on exams when quizzes (both the pop and announced quizzes) were given to them before they took exams. This result is consistent with other studies.

(2) These two types of quizzes did not have the same impact on students' learning. (a) students' exam performance was a little better in the announced-quiz group than in the pop-quiz group; (b) students' attendance was a little better in the pop-quiz group than in the announced-quiz group; and (c) students' out-of-classroom effort was a little greater for the announced-quiz group than for the pop-quiz group.

The first result is not surprising because quizzes (either announced quizzes or pop quizzes) raise the opportunity cost of skipping class. In order to minimize grade loss due to missing quizzes, students need to be in class and prepared for the quizzes, which means they are studying course content more

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material and then conduct the Q&A session after the presentation. This approach allows the two students to get to know each other's material and can help each develop his or her individual ideas more deeply. It's a way to encourage them to learn from and with each other.

ESL students can also be encouraged to become more active by inviting them to bring artifacts that capture key aspects of their cultures or have symbolic meanings in their cultures. They can use these objects to create global moments in their classrooms as well as on campus. Cultural mementos can also be invaluable primary data sources for research projects in many courses that require active inquiry into cultures, literacies, and languages. Those in the office of student life and other student organizations on campus may also be able to use these artifacts in cultural events and displays on campus.

The goal of higher education is not to Americanize international students. Most of our international students return to their home countries. The goal is to help them become more competent global citizens. We should help these students develop intercultural literacy, which Juan Guerra defines as "the ability to consciously and effectively move back and forth among as well as in and out of the discourse communities they belong to or will belong to." (p. 259)

In order to guide this back-and-forth movement between communities, faculty should provide international students with a point of reference and a point of comparison for class activities and assignments. They should be given opportunities to talk and write about their cultural identities, heritages, and conflicts. Their education in the U.S. should not weaken their relationships with their home cultures. They should be constantly encouraged to negotiate and articulate their differences in order to become more competent global citizens (Min, 2012). This is the key to fostering an intercultural educational environment that can benefit both native and non-native speakers in our classrooms and on campus.

Reference: Guerra, J. (1997). The place of intercultural literacy in the writing classroom. In C. Severino, J. Guerra, and J. Butler (Eds.), *Writing in multicultural settings* (pp. 234-244). New York, NY: Modern Language Association of America.

Multiple Choice Exams: An Alternative Structure

Various analyses of multiple-choice test questions have revealed that many of them do not test higher-order thinking abilities. But for many teachers, multiple-choice tests are really the only viable option, or at least that's what most faculty think. Here's an intriguing option that still retains the efficiency of machine-scoring but does involve more student thinking and cleverly motivates them to do this additional mental work. Empirical analysis of the option showed it garnering some pretty impressive results as well.

Students take the multiple-choice exam in class and turn in their answers on a machine-scorable form. They take the test questions home and have until the next class period to correct their answers. They are encouraged to consult the text and their notes and to talk to each other. What motivates their participation in this activity is that they get two points for every question answered correctly on their original answer sheet and on the self-corrected version and they get one point for every wrong answer on the original that has been corrected on the take-home version.

"The idea behind self-correcting exams is that the additional interaction with the material fosters deeper learning. Students are challenged to discover the correct answer, to study the material in their way, and to experience some degree of mastery." (p. 335)

The effects of this particular approach were studied in two sections of a large developmental psychology course. In the control section, students were not given the self-correcting option for any of the three exams or the cumulative final. In the experimental section, students had the option of doing a self-correcting version for exams one and two but not for exam three or the final. All students in the experimental section took the instructor up on the option and completed a revised version of both exams.

When researchers looked at the exam performance of the two groups, they found that "compared to the control sample, students who got the self-correcting option improved more over the course of the semester on the three original exams." (p. 337) The scores of students at every grade level (A through F) were improved with the self-correcting option. However, low-performing students benefited the most. And students who self-corrected their exams did better on the final than those in the control group. More compelling, according to the authors, were the retention benefits of the approach. The more items students corrected on the exams, the better they performed on the corresponding part of the final.

But is this an approach that fosters cheating? It depends on how cheating is defined. The authors contend that studying the text and discussing answers with peers are actions that engage students in ways that promote learning and should not be considered cheating. Obviously, if students were simply copying each other's answers, that would be cheating, but the hedge here is that students don't know whether they've answered the questions correctly. They point out that exams for the self-correcting approach should be on the difficult side, which also resolves the objection that the approach promotes grade inflation. And they note that if students were cheating by copying answers, their better scores on the final exam would be difficult to explain.

Reference: Gruhn, D., and Cheng, Y. (2014). A self-correcting approach to multiple-choice exams improves students' learning. *Teaching of Psychology, 41* (4), 335-339.

Quizzes

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regularly. However, the second result is interesting and merits analysis.

(1) Students in the announced-quiz group knew when they were having quizzes and what material the quiz would cover. Students in the pop-quiz group were not given this information. Thus, students in the announced-quiz group would probably spend a little more time studying for quizzes than students in the pop-quiz group, and this might give them an advantage over those taking the pop quizzes. This explains why students' exam performance and out-of-classroom effort were a little greater in the announced-quiz group than in the pop-quiz group.

(2) Pop quizzes create uncertainty. The best strategy for minimizing grade loss due to uncertainty is to attend class regularly. Those in the announced-quiz group had certainty. Hence, students in the announced-quiz group might not attend class as often, some attending only when quizzes or exams were scheduled. This explains why students' attendance was a little better in the pop-quiz group than in the announced-quiz group.

The most important finding was that different types of quizzes serve different instructional purposes. For example, if instructors are most interested in increasing students' attendance and participation, the pop-quiz policy may be a more effective pedagogical method. Furthermore, pop quizzes promote student attentiveness. Those who leave early or don't listen in class will either miss quizzes or be unable to answer questions correctly.

The effectiveness of quizzes in promoting learning outcomes increases when the quizzes are worth a significant portion of the course grade. For instance, if the quizzes count for only 5 or 10 percent of the course grade, students may not take them as seriously, rendering the effects of quizzes on attendance, participation, preparation, and exam performance less significant.