



## Self-Assessment Does Not Necessarily Mean Self-Grading

Most faculty judiciously avoid having students self-assess because it seems hopelessly naïve to imagine them being able to look at anything beyond the desired grade. Even so, the ability to self-assess skills and completed work is important. Moreover, it is an ability acquired with practice and developed with feedback. It seems like the kind of skill that should be addressed in college. And perhaps there is a way.

Professor Heidi Andrade and doctoral student Ying Du suggest that teachers frame self-assessment as an opportunity for students to reflect on their own work with the goal of learning more, making the work better, and thereby improving the chances for a good grade. In this paradigm, self-assessment is not the same as self-grading. Rather, students are looking at their work and judging the degree to which it reflects the goals of the assignment and the assessment criteria the teacher will be using to evaluate the work. “Put simply, we see self-assessment as feedback for oneself from oneself.” (p. 160) Students in Andrade’s educational psychology course were given rubrics and checklists for each assignment. Prior to submitting the assignment, students used these assessment tools to judge their work. They were required to submit their self-assessments with the completed work, but their assessments were not graded.

Andrade and Du then conducted a series of interviews with students to explore their reactions to self-assessment conducted this way. They chose their sample purposefully “for its potential to illuminate areas in need of further study, not to represent a larger population.” (p. 163) This limits the generalizability of their findings, but their interviews offer insights

into the experience of a population who responded thoughtfully to the experience.

Students in this sample reported that their attitudes toward self-assessment became more positive as their experiences with the process accumulated. Noteworthy was the fact that none of this sample reported having any previous experiences with academic self-assessment. Not surprisingly, they didn’t value their opinions about their work and saw self-assessment as a vehicle for figuring out the teacher’s expectations. “The difference between self-assessment and giving the teacher what he or she wants was a recurring theme. A few students referred to self-assessment in terms of their own expectations. More often, however, students spoke of the tension between their own and the teacher’s expectations. ... Over and over again, students rejected their own judgments of their work in favor of guessing how their teacher or professor would grade it.” (p. 168)

These students reported that their ability to self-assess depended on knowing what the teacher expected. In an appendix Andrade and Du share some of the rubrics and checklists used in this educational psychology course. They are very clear and explicit.

When they self-assessed, these students reported that they checked their work, revised it, and reflected on it more generally. Before this class their self-assessment efforts were “relatively mindless.” (p. 65) But from this experience they learned that careful self-assessment could improve their work to the degree that they did get better grades. Most did not see the larger value of the skill they were developing. Most did not use self-assessment in their other courses. They did see potential value in

doing so. “They cited a lack of motivation and a lack of support for self-assessment among the reasons that ‘we slip.’” (p. 166)

Based on their experience and analysis of the interviews, Andrade and Du offer some tentative implications. First, “student self-assessment is feasible and likely to be beneficial if it is employed as a process of having students critically review their own work with an eye for improvement.” (p. 172) They also recommend that teachers share expectations for assignments and define quality. Showing students examples of effective and ineffective pieces of work can help to make those definitions real and relevant.

As this work illustrates, self-assessment need not necessarily be about self-grading. There are ways of framing and then using self-assessment that can help students develop that all-important ability of looking objectively at their work and then making changes that improve its quality.

Reference: Andrade, H., and Du, Y. (2007). Student responses to criteria-referenced self-assessment. *Assessment & Evaluation in Higher Education*, 32 (2), 159–181. ♥

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## Teaching Undergraduate Research: A Unique Model

Teaching undergraduate research when laboratories are involved is a time-consuming and costly endeavor, especially at those institutions without graduate assistants. One faculty member working alongside two or three students for four hours a week for one credit isn't a particularly viable approach. For faculty who use undergrads to support their research programs, this approach slows down productivity as proficient students graduate and new ones must be trained in an unending cycle.

Three faculty members at Drake University developed an alternative model, which in some respects harkens back to the days of the one-room schoolhouse. The teaching that occurs in this particular research course (part of a degree program that requires students to participate in research) is done by teachers and senior students. The learning flows "seamlessly among the community of students" (p. 29) as they progress through the course curriculum.

To make the model work, the faculty had to begin by acknowledging that they weren't the sole knowledge holders in the group. "Students could teach those less experienced if we helped them learn how to lead and teach." Faculty also were not the only managers in the group. With guidance and instruction, "students could plan, organize, and test if we helped them learn how to manage." And finally, "students could build community if we helped them learn how to nurture and respect diversity. It was a liberating moment! We could safely step off the stage and become part of the community." (p. 28)

Like the one-room schoolhouse, all students are together in the same course. They meet as a team for about two hours a week and work in the lab doing research for about 12 hours. Students are in the lab throughout the day according to a prearranged schedule. They participate based on their level of experience; some are novice researchers, others senior researchers, and still others mentors.

Over the 10 years this model has been

developed, the faculty have had students involved with three different research projects. They have selected large topics that can then be broken down into smaller research projects. For example, their first project examined genetically engineered corn and included research on the components of the gene construct, tissue-specific gene expression, and protein characterization.

The model has generated a number of side benefits, including an increased level of comfort for students, even though initially the learning curve is very steep. Student mentors work closely with students new to the course, which leaves faculty free to help with particularly challenging research techniques. The course also develops a stronger sense of community among students, in part because they learn much more than just how to conduct research. "They also learned to teach, nurture, plan, manage, build a team, solve the problem, organize, communicate, etc. In other words, they learn to operate in a team and to become team leaders." (p. 31) Faculty note that this kind of learning involved new skills for them to teach.

Perhaps the most important measure of this model's success has been its productivity. In one year, which the faculty describe as typical, the course resulted in nine oral presentations at professional meetings, two papers submitted for publication, and one paper published in an international journal. Participants in projects for that year included two faculty, one surgeon, one research scientist, one surgical resident, and 33 undergraduate students. The course is managed by three faculty members who productively engage an average of 30 students a semester in research. That makes their one-room schoolhouse model a very impressive one.

Reference: Henderson, L., Buising, C., and Walls, P. (2008). Teaching undergraduate research: The one-room schoolhouse model. *Biochemistry and Molecular Biology Education*, 36 (1), 28-33. 🍀

## Do Problem-Solving Abilities Develop in Groups?

**P**roblem solving: “what you do when you don’t know what to do.” What a simple, straightforward definition for something often defined in much more complex ways. But problem solving doesn’t always mean the same thing. It might be the solution to a specific problem, like those that appear on math quizzes, or it might be a collection of possibilities that respond to a complex open-ended problem. But however it’s defined, problem solving is one of those skills all teachers aspire to have their students develop.

Understanding how problem-solving abilities develop is not easy, and measuring their development is even more complex. As a result, much of the research involves analysis of learners solving “knowledge-lean, closed problems that do not require any specific content knowledge to solve and that have a specific path to the answer.” (p. 866) What this means is that “while we know a great deal about the problem-solving process in an abstract environment, we do not in fact have much insight into how students solve many types of scientific problems.” (p. 866) Not having this knowledge makes it pretty difficult to address problems that students may have as they work to solve more complex problems, like those included in an introductory chemistry course, for example.

But technology can help with the understanding of how students solve these more complex problems. The research reported in this article uses a software system that allows teachers to “track students’ movement through a problem and model their progress as they perform multiple problems.” (p. 867) The software uses case-based problems, for example, a chemistry case in which the student must identify an unknown compound based on physical and chemical tests that the student requests. There are “literally thousands” (p. 867) of possible paths that a student can take through this problem, according to the article, and the software can aggregate similar performances. Previous research has documented that the

problem-solving ability of a typical student will not improve after he or she has completed about five problems using this software. Their problem-solving ability “stabilizes.” (p. 868)

Given what other research has documented about the effectiveness of working collaboratively in groups on problems, this research team wanted to explore a “tantalizing” (p. 869) possibility: that collaborative groups might be effective in promoting the further development of problem-solving abilities. If groups were effective, would that benefit be retained when students went back to solving problems on their own? To answer those questions and another on how the nature of the group might affect the group’s effectiveness, researchers had students “stabilize” by working five problems individually; they then did five more problems collaboratively in pairs, and finally they did another five problems on their own.

Results? “Even individuals who had been given time to stabilize on a strategy adopted different strategies after solving problems in collaborative groups.” Better yet, after working with a partner, “a higher percentage of students adopted more successful strategies.” (p. 869) Based on data manipulation made possible with the software program, researchers conclude that most students improved by about 10 percent.

But that wasn’t all. Researchers grouped students according to their scores on a Group Assessment of Logical Thinking test. This instrument places students in one of three groups (based on Piaget’s theories of intellectual development) according to their level of thinking. About 50 percent of first-year college students are in

the highest level. The collaborative pairs used in this research combined students from the same level for some of the pairs and students from different levels in other pairs. When a student in the lowest level was partnered with a student in the middle or high level, the lowest-level student had gains equal to those in all the other groups, “indicating that if they are paired with a student who can explain the problem and discuss it with them, they can improve their problem-solving performance significantly.” (p. 870) Interestingly, when students from the middle level were paired with those from the lower level, the middle-level students also became more proficient problem solvers.

Conclusion? “Using over 100,000 performances by 713 students on a problem, we have shown that we can improve student problem solving by having students work collaboratively in groups. These improvements are retained after grouping and provide further evidence of the positive effects of having students work in groups.” (p. 871) Next month we will explore researchers’ answer to this question: “Why does simply working collaboratively in a group in an unstructured environment appear to have such a positive effect on problem solving, and why does this effect linger in subsequent performances?” (p. 871)

Reference: Cooper, M. M., Cox Jr., C. T., Nammouz, M., Case, E., and Stevens, R. (2008). An assessment of the effect of collaborative groups on students’ problem-solving strategies and abilities. *Journal of Chemical Education*, 85 (6), 866–872. 🍀

### Online Seminar Call for Proposals

Magna Publications is accepting proposals for its online seminar series. For more information on how our online seminars work, visit [www.magnapubs.com/calendar/index-cat-type.html](http://www.magnapubs.com/calendar/index-cat-type.html).

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# Modular Assignments: Learning Episodes for Diverse Students

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On our campus, we have growing numbers of nontraditional students. The demands on their time out of class are numerous—work, family, and military obligations. Their lives are complicated to an extent that rivals television soap opera episodes. It is my job to meet them where they can learn and benefit.

One tool that I have used in a general education biology course is a suite of modules that allow creativity, encourage initiative, and make use of analysis and writing. These modules are more or less traditional assignments, but in shorter formats. I have designed them with two facts in mind: students have other demands on their time regardless of my memories of the way things used to be in my undergraduate days, and the digital, virtual world of computing doesn't solve all workload problems or learning objectives for either the students or myself.

My goals have changed—they aren't as lofty as they once were. I recognize now that I am not training up the next cohort of professionals in a survey course. I want students to see the relevance of topics they may disdain or find confusing. It would be nice if after they finish my class, they could read articles in the newspaper (or online) and understand how that information

relates to them personally, locally, or even globally. Perhaps they'll simply have a better shot at understanding their physician, if someday the doc sits on the front of her desk, leans in with nonverbal attentiveness, and hits them with, "We need to talk about your test results. The histologist found evidence of a melanoma in your biopsy." For those in business, maybe it would be the investment broker or the CEO leaning in with the bad news.

Almost any traditional assignment can be modularized. For example, I have used one that links a student's journal record of dietary intake, interpretation of the FDA nutrition labels, and the biologically important macromolecules. With that, I was able to take advantage of timely information on military "First Strike" rations or even the daily diet of Olympic gold medal swimmer Michael Phelps, for comparison to daily intakes. Another module ties in the study of genetics to family genealogy and human genetic variations or disorders. Another, coordinated with a photosynthesis lab, relates data in absorbance spectral graphs to environmental research in remote sensing. Additionally, students see how that information can be used in artistry, with infrared landscape photography. With the remote sensing, students also consider how they could apply this data to current or future lifestyle questions, perhaps with land they'll own, or where they'll go boating, or for vacation

planning. A module not intended for topical content is a visual-auditory-kinesthetic learning styles survey that I refer to throughout the semester to help students become deliberate in using different study skills.

As these examples illustrate, I now accomplish course goals by engaging the students in more pointed, brief units that fit the time demands of their diverse lives. Modules like these also show students that what they study in courses, even required courses not necessarily in their fields, is relevant to their everyday lives.

I have heard the youngest of our university students referred to as the "episode generation." That may be an apt description, but it doesn't fit the diverse student population I teach. Some of them thrive on epic dramas, while others prefer miniseries, and still others love their sitcoms. With a number of modules that I have used through the years, getting each to engage in a way that maintains his or her interest involves creation of something like an episode of learning. Comparisons, technical writing, journaling, even value calls on issues involving course information can successfully yield reasonably savvy students. As with episodes online or on TV, these modules also allow for a certain amount of "product placement"—the course content we hope for them to learn.

## STUDENT PERFORMANCE

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a 14-item evaluation instrument, "there are very few real differences between their evaluations." (p. 390) On some items the online scores are higher and on other items they are higher in the face-to-face course.

This article is noteworthy as an example of how faculty can do research using their own classes and instructional situations. It does an excellent job of delineating what variables can and cannot be controlled

when faculty go about comparing different "treatments" and their influence on learning outcomes. Often teachers cannot control important variables, like class size in this case. That does result in findings that are less definitive, but the value here is not so much adding to what is known about the effects of online versus face-to-face instruction, but what an individual faculty member can learn about his or her own practice. Dolan discovered answers to one set of questions, but her research, like most, raised equally intriguing questions. Now

Dolan wonders whether online courses are better in some content areas than in others. Should beginning students be discouraged from taking online courses? Do the convenience and cost savings of online courses substitute for the "real" learning that can take place face to face?

Reference: Dolan, K. (2008). Comparing modes of instruction: The relative efficacy of on-line and in-person teaching for student learning. *PS: Political Science and Politics*, 41 (2), 387–391.

## Student Performance and Satisfaction: Online vs. Face to Face

Many faculty have questions about the relative merits of online courses versus the traditional face-to-face classroom experiences. Researchers also have an interest in the question, and a variety of studies have been conducted with the usual mixed results but overall accumulating evidence that online courses can provide rich learning experiences. But for many faculty, it is still an open and individual question. Many would like to have the opportunity Kathleen Dolan describes.

Dolan simultaneously taught sections of an introduction to American government class face to face and online. She did so for two consecutive semesters and decided this unique opportunity gave her the chance to collect data that would allow her to determine if the mode of instruction influenced student performance and satisfaction. She structured the courses as similarly as possible. Both courses covered the same con-

tent. Students in each took three exams and completed the same Web-based writing assignment. They used the same textbook as well.

Despite these similarities, there were some differences between the two courses. Students in the face-to-face course took their own lecture notes. Dolan made a lecture outline available to them, but in the online course, given the script nature of the lectures, students had access to a more complete set of notes. Furthermore, students in the online course were required to participate in an online discussion exchange. They responded to questions and comments made by other students. The number of students in the face-to-face class was significantly larger than the number in the online course, and discussion there was limited to the 10 to 12 students who regularly responded to the teacher's questions. But beyond the instructor's inability to

control for note taking, discussion, and class size, a survey on which demographic details such as gender, GPA, reason for taking the course, and previous coursework in the area were collected revealed that the only difference between these groups of students was that those enrolled in the online course were a bit older and further along in school.

The average grade for students in the face-to-face course was 77/100 and for those in the online course it was 81/100, or the difference between a C and a B-. Obviously the variables Dolan couldn't control and the age difference between the groups may account for the different levels in performance. However, Dolan did a regression analysis and the differences in performance levels were maintained. As for satisfaction with the course, as measured by

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## Assessing Internships

Internships are integral parts of many professional degree programs. Potentially, they make significant contributions to an educational experience. "Well-organized and carefully supervised programs enhance the student's ability to integrate academic knowledge with practical application, improve job/career opportunities after graduation, create relevance for past and future classroom learning, develop work place social and human relations skills, and provide the opportunity for students to apply communication and problem-solving skills." (p. 208) Deborah F. Beard identifies these contributions in an article on assessing internship experiences in the field of accounting. Even though her reference is to accounting, internship experiences in many fields accomplish these or similar objectives.

The value of an internship experience is enhanced when that experience is carefully and systematically assessed. Beard notes that the evaluations of the accounting internship experience she describes "pro-

vide information about students' traits, knowledge, skills, and behaviors as well as perspectives on coursework, activities, and suggested curriculum changes." (p. 211) The challenge is finding those assessment mechanisms that work well to assess internship experiences. Obviously, a multiple-choice exam is not especially useful. In the accounting internship that Beard describes, students begin by identifying a set of goals and objectives for their internship experience. These goals are used to help place students in appropriate internships and provide the overarching framework for the assessment of their performance in the internship.

Students doing internships in this program complete a weekly diary/journal that logs their experiences and insights gained from them. Students also send regular emails to their on-campus internship supervisors. At the conclusion of the internship, they prepare a paper that includes an overview of the accounting

field, an overview of the company where the internship was completed, a reaction to the internship, and an evaluation of it based on its relationship to previously completed coursework. This paper is accompanied by an oral presentation. All these materials are assessed by the on-campus internship supervisor. A student's performance during the internship is evaluated by the on-site supervisor as well.

Both students and on-site supervisors are given opportunities to assess the internship program and their experiences associated with it. This feedback helps those responsible for the program to adjust course content, assignments, and activities so that the degree program curriculum and the internship are coordinated and integrated learning experiences.

Even though this article describes an assessment plan for internships in accounting, it offers an excellent model of

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# The Student-Accessible Reading List

*Ed.'s note: Our February issue contained an article about reading lists that prompted this reply. We always appreciate when readers write to share their thinking and experience with those aspects of instruction we're writing about in the newsletter.*

By David M. Dolence, Dominican University, IL  
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I have always been a huge supporter of reading lists and thus was excited to see the article "The Use of Reading Lists" in the *Teaching Professor* newsletter. The article raised some concerns and questions that I have asked often. In fact, just recently I changed my approach to reading lists and would like to share that adaptation. It's too soon to know for sure, but anecdotal evidence makes me hopeful that student reading beyond course requirements is not a utopian dream.

Many reading lists are not accessible to students for two main reasons. First, they are not connected to specific courses. For example, our department has a reading list that includes a number of quality texts from the various subfields within the discipline, and it is quite good. However, this list was created not for a course, but for the discipline in general. Second, and more important, reading lists can be extremely intimidating in their size and scope. Students new to the field don't have any idea where to begin. Although it is helpful to divide reading lists into "most important" readings and subject area readings, the end result is still a long and daunting list more often than not. The best students will read books from it, but they are also the students who would ask for additional readings without the list.

Recognizing the value of continued reading and the inaccessibility of many reading lists, I decided to attack both problems. First, I decided to create reading lists closely tied to each specific course—not just to the subject of the course, but to specific class discussions and topics that were addressed as the course progressed. This means I didn't start the course with a

pre-made list but constructed it as the course went along, and I shared it with students at the end of the course. This way the reading list became a way to extend the course beyond the scheduled semester. Using the course email list, I send the reading list to students at the end of the semester, with a personal statement about the importance of continued reading and learning beyond the classroom.

To make the list more accessible, I limit the number of readings to three or maybe four and I annotate each reading. I choose these readings very carefully and with three different groups of students in mind. I choose one reading for the student who already loves the discipline, be that student one of our majors or someone with a declared minor in the field. I select an important work in the field and one that discusses a topic that was particularly interesting to the class as evidenced by discussion or out-of-class questions. I remind students of this interest in the annotation. The reading is directly tied to the course and is not just another book on the topic.

I choose the second reading for those students who enjoyed the course but have no deep interest in the discipline. It is important that this reading not be discipline heavy, but that it engage a popular course topic of discussion in an accessible way. For example, in a presidency course we had a particularly good discussion on power and corruption, and as a result, I recommended Warren's *All the King's Men*, with an annotation that specifically spoke to that topic and mentioned violent death in a state capitol building.

My last selection is the most difficult but in many ways the most important. This reading is for students who did enjoy the course and would not be averse to some more exposure, but who won't extend themselves to get it. (I do eliminate the student who did not enjoy the course and is happy to move on.) For the student interested but not terribly motivated, I make a reading suggestion much more lax by academic standards. In fact, in the past I have included movies and songs on my "reading" list. Some colleagues may shun

this approach, but to provide a personal anecdote, I first read Coleridge's *Rime of the Ancient Mariner* in high school entirely because I enjoyed an Iron Maiden song by the same name, which led me to the poem. I no longer have Iron Maiden CDs in my collection, but a well-worn collection of Coleridge remains on my bookshelf.

In the several semesters since I have started using the end-of-course reading suggestions, I believe they have proven to be more effective than the standard reading list. I have had two students specifically approach me a semester after the course and mention a book from the reading list that they read. In addition, I have had many more emails that have thanked me for the suggestions or mentioned looking into one of the readings. This may be minimal evidence, but it is a far more direct success than I had with more traditional reading lists. A real value of reading lists is keeping the topic alive in students beyond the classroom and for the rest of their lives. ♥

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## ASSESSING INTERNSHIPS

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a comprehensive approach to assessment. It is also very helpful because various sample materials are included in the article, such as a set of guidelines for employers supervising internships, a detailed list of components students are expected to include in their internship papers, and the form on-site internship supervisors use to evaluate students. For anyone just beginning an internship program, these materials are excellent models. And for those with programs, this article offers materials useful for comparative purposes.

Reference: Beard, D. F. (2007). Assessment of internship experiences and accounting core competencies. *Accounting Education*, 16 (2), 207–220. ♥