



# Two-Stage Collaborative Assessment

## Beyond the Podium Podcast

### Alexandra

Do you remember those anxiety-ridden days in college, or even high school, when you had stayed up till some ungodly hour the night before trying to cram as much information into your brain before an exam, just to spit it back out hours later and never again think about it? I can remember-- the jitters, the butterflies in my stomach, the feeling of impending doom.

And yet, I was actually a pretty good test taker. I would settle into a rhythm, pencil in hand, and get the work done. But I never felt as if my exams actually contributed to my learning experience. And that is exactly what David Julian is doing. He is breaking the mold of the old pattern of high-stakes testing to transform his exams into an integral part of the learning experience.

Hello. My name is Alexandra Bitton-Bailey. And I want to welcome you to today's episode of "Beyond the Podium" podcast series. This podcast is on teaching and learning. And our guests offer their best tips, strategies, innovations, and stories about teaching. Today's episode is about collaborative two-stage testing. And our guest is David Julian.

### David Julian

So I'm David Julian. I'm in the Department of Biology. I am a physiologist. I came here in 2000. As a graduate student I was very interested in education-- in fact, spent more time than I should have helping to teach some of the medical school physiology courses, and learning from people who really were quite invested in trying to be innovative in the way that they taught medical students.

### Alexandra

David's interest in teaching has stuck with him. And it has influenced how he approaches the classroom today. David starts by thinking about, what is actually important for students to learn? What should they walk away with? What skills will be valuable to them in their future? And it is his opinion that it is not memorization that is significant.

## David Julian

So we typically encourage students to learn by memorization, and sometimes by recognizing patterns. But in order to diagnose something that's unusual, or to uncover the causes of diseases or even the way that normal physiology works, you need to have an understanding of how all the processes interact. And I believe that if the students have this-- if we can utilize the foundational knowledge that we tell the students to take-- if we can utilize that more, that the students can start to recognize that based on a complete, first-principles understanding of why A leads to B, which leads to C, which leads to D, when you can make these processes more intuitive, than it doesn't matter if you forgot what's between B and D, right? You can intuit it. And so it's far easier to do that than to memorize.

## Alexandra

So how does this way of thinking about learning impact and ultimately transform how students should be assessed? How do we know that they got where they needed to get?

## David Julian

So when I was at a conference-- I guess it was about a year and a half ago, I met someone who was doing this two-stage testing. I hadn't heard about it before. And as he described it to me, I thought it sounded great. So I was mid-semester. So I came back and told the students that we were doing the final exam differently than the midterm. And the results were really positive.

And in collaborative, two-stage testing, what happens is the students take the exam individually for a period of time. And then they submit their answers to that. And then they are given a period of time to take either the same exam, or a similar exam, or a subset of the exam questions, and to work on it collaboratively. And then they submit the responses again.

And there are various ways that people have done this. They're, overall, basically pretty similar. This has been around since at least the early 1990s. But it really is only within the last two or three years that it's really started to take off, especially within the sciences.

## Alexandra

So how does collaborative, two-stage testing work? And why does it work? What are the benefits of this kind of assessment?

## David Julian

It's ideal when-- not when your exam is based on recall, right? There's no point in doing that when the exam is based on recall. But it's good when the exam is based on problem solving. And what you find, in addition to it being consistent with-- at least in my case-- the structure of the class, is there are a number of benefits.

It certainly increases student engagement during the collaborative portion of the exam. It's been argued that it achieves outcome similar to peer learning, but with higher levels of student engagement. The students get immediate feedback during the collaborative portion, when they're discussing their answer with the other students. They are able to argue their point with other students, and have the other students argue their points to them.

If they have an answer that's consistent with other students in their group, they get positive feedback on that. So it increases their confidence. If their answer is different from the other students, they have an opportunity to evaluate whether the other students' argument is better than their own. And then they feel better that they were able to recognize the correct answer.

## Alexandra

This kind of testing actually provides students with skills invaluable to their future work. It provides them with collaboration skills and the ability to defend ideas. Most importantly, it gets them engaged. And it makes tests actually enjoyable.

## David Julian

For me, the most important and unexpected outcome, which is the reason why I am most enthusiastic about, it is the attitude of the students during the exam and afterward. Whereas after a typical exam where the students work alone, they can leave the exam rather morose, usually, right-- stressed, unhappy. But when they leave the exam when the final part is collaboratively, almost without exception-- there are only a couple of exceptions-- the students are smiling. They're happy. They're laughing, they're much more excited, they're much more confident.

And when I have asked the students how they feel about it, when I've done a survey, the students report that they have greatly decreased anxiety. So 90% of the students who responded said that the exam increased their happiness, increased their confidence, and decreased their anxiety during the test. And in fact, in the comments that students made, that was the most salient and consistent point, was anxiety. Although I asked them a series of nine things that they could have identified as benefits, it was anxiety that kept coming through.

## Alexandra

David explains the nuts and bolts of two-stage testing, and how it can be done in really any class. What he discovered is that this collaborative portion of an exam, despite being only worth a fraction of the points, becomes a valuable learning and teaching moment.

## David Julian

So in my application, my class is two periods. I use 80 minutes for the first stage, or the individual exam, and then 40 minutes for the second stage, which is the group exam. They answer exactly the same questions. But it takes them far less time on the second round, because they've all seen the questions. It's fresh in their minds. So they don't need to reread the questions.

And instead, they focus in on, what were the ones that they feel they're most likely to have gotten wrong? What were the ones that were the most confusing? So I'm able to do it with that split. And 80% of the grade for the exam comes from the individual effort. And only 20% of the grade comes from the group effort. But the students really feel that the group effort really changes the dynamic of the entire exam.

## Alexandra

Since the collaborative portion of David's exams is worth so few points, you might wonder if it really does make a difference to the students. But in fact, the difference is that students' mastery of the knowledge is dramatically transformed in this collaborative portion of the exam.

## David Julian

Typically, when people have done this they see increases of around 5% to 10% between the average score on the individual exam to the average score on a group exam. I see much larger changes. That may be because my exam is much harder. But I'm seeing, on average, around 20% improvement. And the range is from 0% for the top to students who-- they didn't get a perfect score but they didn't get a worse score-- to 53% increase for the students who were the lowest-scoring students. It's a very tight correlation-- r-squared of about 0.85.

And what that tells me is that even the students who weren't able to answer the question the first time were able to recognize which of the students around them were making the most cogent argument for what was the correct answer. When students in other programs, where they've reported back on this, they've said there appears to be an enhancement. Or when people have analyzed it, there appear to be enhancements of test-taking skills, metacognition, improvements in collaborative and group work.

And people who have done assessments have determined that the mastery of the questions of the students in a group after the group work-- each individual student's mastery is approximately equivalent to the mastery of the group. In other words, those students who didn't understand the question didn't just simply hear somebody say it's D not C, and then put D. It turns out that those students who didn't understand it really did actually understand the question.

So if the objective of an assessment is not simply to assess whether the students have learned, but to use the assessment as part of the learning process, what you find is that the exam is a really key opportunity to increase the learning outcomes, not just to determine if the students have achieved them, because their stress level is high, right? Their engagement is extraordinarily high. They've just tried to answer these questions individually. And now, immediately afterward, they're trying to answer these questions as a group. So they're as engaged as they're ever going to be in that. And that's when they're able to make these connections.

And I find that since I've done this, I've never had a student come up to me after the exam asking for clarification on a question, or complain that a question was unfair, because they've realized that other people in the class understood it. And they were able to explain how they understood it. So the students are able to see-- OK, this person approached this problem differently than I did. This person analyzed it in this way. So the students come away not only with a mastery of it, but also a better comprehension of how the students who did understand it, how they approached that problem and how they solved that problem.

## Alexandra

It's really quite remarkable that using this creative and innovative way of testing helps students to build their confidence, that they now realize they can apply what they've learned to entirely new problems. These tests aren't simply a standalone assessment piece, but a problem-solving, confidence-building experience.

## David Julian

It's not just what have you learned and how can you show me? But can you apply that, and can you use the exam to increase your confidence in the material? So I like to put questions on the exam on things they haven't learned, right, that they can solve by making connections between different parts of the course. And by doing that in the context of an exam, under pressure, they actually realize that they can solve completely new problems.

And I think they come away with greater confidence in their understanding. As the cognitive psychologist Dan Schwartz said, "if you ask someone else for help on a problem in an exam, you're cheating. But if you don't ask someone for help on a problem in the real world, you're a fool." So essentially, what you're doing in this collaborative exam is you're saying OK, let's use the strength of the group. Let's use the strength of your ability to interact with the other students to query them, to engage them in a discussion on what the right answer is.

And I should point out that the class-- when I do this, it's astoundingly active. It's so fun to watch. Because in this classroom, of course, it's set up just as a huge open room with lots of pods. And when I say go on that second exam, it's just chaos, because I allow the students to talk with anybody, and because in that classroom any student can project their computer to the monitors for each group. So the students are projecting. And then you see them up on the screen pointing out things on the figures, arguing points, drawing graphs, really trying to convince people that they're right. And it's exactly the kind of engagement that you want to see.

Now, I have to say that I think that this wouldn't work if the class wasn't structured to have already been reinforcing the collaborative work. So all throughout the class, the students are working in groups. So they're familiar with how the others think. They know the strengths of the other students. And even the students who aren't strong in some of the questions, there's usually something. All these students are going to be good at something. They're going to be able to save the day on one of these questions, right?

## Alexandra

What's even better is that all students, even the quiet, shy ones, get to contribute. Their value is noticed and appreciated.

## David Julian

That's something that happens. You really do see that develop over time, that people eventually realize that the quiet person actually has some really good ideas. And you can't just always speak over them. So you do see that happen. It really is nice to watch that develop over the course of the semester, to see the students really work better as teams.

## Alexandra

Thank you for listening to this episode of the "Beyond the Podium" podcast series. For more information on creative ways of assessing your students, take a look at the [teach.ufl.edu](http://teach.ufl.edu) website and resource library. We're happy you joined us. And we hope to see you next time for more tips, strategies, ideas on teaching and learning at the University of Florida.