



High-Stakes Testing Alternative

Beyond the Podium Podcast

Alexandra

Hello, my name is Alexandra Bitton-Bailey and welcome to the Beyond the Podium Podcast Series. This podcast series is on teaching and learning. And our guests offer their best tips, strategies, innovations, and stories about teaching.

In this episode, we're going to talk about standards-based grading with Professor Kevin Knudson, who is the chair of the math department at the University of Florida. The undergraduate coordinator, Kevin is also a member of the Academy of Distinguished Teaching Scholars. And he is a tireless advocate for creative thinking and teaching to the benefit of all students.

Kevin Knudson

When I was about 14 or whatever, I decided I was going to go to college. Then I was going to go to graduate school and get a PhD in math and be a college professor. No one in my family had ever gone to college. And I thought, well, I'm just going to keep going. And I just loved mathematics.

But I always wanted to be a professor. I love my research program. But boy, I love teaching. Because if nothing else, if my research is going poorly or whatever, I can go give a good lecture. And I still love that sort of spark of realization in students that they-- when they finally sort of get something.

Alexandra

Kevin loves teaching. He loves to see that moment of understanding. But math, much like foreign languages, can be the stumbling block for many students. Kevin came across the realization that the way students were being assessed was less than ideal.

Kevin Knudson

This begins with a question, which is, what does it mean for a student to get an 85 on a test? You give an exam. And through some scheme, you put a number on it like 85. And what does that mean? And most students go, oh, I got an 85. Great. But what does it really mean?

Does it mean that the student knew most of the material mostly-- sort of got 4/5 credit on every question? Or does it mean that they knew 85% of the material completely? And which is better in some sense? And so because grades in this way-- and that when you just put a number on a piece of paper, it's completely unclear what it even means.

You have no sense of-- I mean, once the paper is gone from you and all you see is the number, you have no idea what that student knows. And so the idea behind standards-based grading is to sort of make the scheme finer in the sense of, OK, instead of giving you one big exam where I'm going to put a number on at the end and that number is going to define you moving forward, let's break this into smaller pieces that we can assess individually.

So I mean, I'll use mathematics as an example, because it's my own discipline. But in a calculus class-- a first semester calculus class-- there are all sorts of things around the derivative that you want students to understand. So there's various-- can you just compute some of them? Do you know various rules for calculating derivatives?

Can you use derivatives to solve related rates questions? Can you use them for approximation? Can you use them to find optimal values for things? Those are sort of the main applications. And if you just have one big test where all that's on there, you don't know what the student knows and what they don't know.

So instead, you have a single assessment for, OK, this assessment is about the chain rule, whatever that is. OK? And then the student can prove through doing a few sample problems that they understand it or they don't. And there are various ways to aggregate scores for all this.

You could make an assessment all or nothing, like it has to be perfect, or they don't pass. Or maybe you can sort of aggregate points. You give them two or three assessments. And if they can accumulate a certain number of correct things out of those three, then you can say that they've mastered that concept.

I tend to do the all or nothing, where then students have lots of chances to do it. What's great about it is first of all, you then-- at the end of the semester, you don't have a number. You have a list of things that the student has mastered. You still have to turn that into a grade, because that's what universities do. We give grades.

But you can-- you have a certain number of these things. Then it's sort of-- you can say-- OK, say there are 15 of these things. All right. You have to get 12 of them. You have to master 12 things to get an A, 10 to get a B or whatever. And what's even better is-- and I did this in my class.

I think there are two fundamental applications of differential calculus, that if you can't prove that you've mastered those, you cannot earn an A in the course. Even if you mastered 12 and you didn't master these particular two, I'll give you an A minus. But I won't give you an A, because you can't do the thing that really you should be able to do. So you can even get those sorts of even finer gradations.

Alexandra

This idea of being able to finally sift through what students were really capable of, what they had truly mastered sparked Kevin's curiosity. How could a different means of assessment change a student's experience and transform their learning?

Kevin Knudson

A bunch of math teachers and math professors are sort of chatting about standards-based grading. I thought, oh, that's interesting. Let me look into this a little bit. And then I read a few articles, or blog posts, and things like that. And I thought, OK, let's give this a try. This was a bit risky in a certain sense, right?

Because for example, I did it in calculus. And I had a section of a hundred students. And then the other 1,700 students in Calculus 1 were taking the more traditional large lecture. And what if my students didn't like it? What if it just didn't work? What if it just crashed? What if these students didn't learn anything?

Luckily, it didn't crash. They did learn something. Some of them-- and I'll be completely honest. Some of them didn't like it. They just-- they were like, no, I want to go sit in the big lecture. Now, I mean, I think it's because they didn't want to feel obligated to come to class and really participate. I was also flipping the classroom at the same time. So some students don't like that.

They want to just zone out in the lecture. But they all did like the standards-based aspect, because they felt that, I've got a chance. I've always got a chance. And they did. And they all did really well. I didn't fail anybody. A couple people dropped. And then a couple people got Cs, but that's OK. That's going to happen no matter what.

Alexandra

Kevin's first try at using standards-based grading worked. Despite his apprehensions and those of others, it worked. And not only did it work, but the results and impacts were remarkable.

Kevin Knudson

When you hand papers back to students, they'll say, well, why did I lose three points for this? Even if you give them a rubric, they'll still argue sometimes about, well, can I have two points here? What's a point? When you have these things, points are things that the instructor is like, I've got a pot of points, and I'm going to hand them out to you.

Well, what good is that? I don't want to argue about points. That's ridiculous. So when you have these assessments, what's nice is you can say to them, look, you didn't master this. Let's talk about why you didn't master this. Because there is no giving you more points, so that you can say that you mastered it. You didn't. So what's wrong?

And how can you-- what needs to evolve in your understanding so that you can then demonstrate that you have mastered it later? And another advantage of this is sometimes it just takes time for stuff to click in. So you've got some topic in the middle of the course that's kind of heavy duty. And you give one test on it in the middle of the course. And the student doesn't really get it yet, and they bomb that test.

And then they never really have another chance to prove it to you, until maybe the final where you throw one question on there. Does everybody have to learn at the same pace? Maybe. The student will get it if they have a little more time to demonstrate that they've gotten it. So for all these reasons, it's really a nice mechanism.

Alexandra

Standards-based grading is the system that embeds learning in the assessment process by allowing students to persist at their learning. They can give mastering and competency their best shot multiple times. And for most, until they master it.

Kevin Knudson

Once you come up with a metric for anything-- and this is, in the end, just another metric. They will optimize for that metric. This is rational human behavior. So some of them want to just get stuff out of the way as quickly as they can and then just kind of forget about it. Because I'll still have a final exam at the end, but they just have to pass it.

And so if they've mastered everything, they can probably pass the final exam and not have to study very hard for it. Because it doesn't really factor into the grade that much. But what it encourages more than sort of long-term learning even more is just sort of this idea that, well, you can't get everything on the first try.

So it allows for better persistence. And students don't get discouraged so quickly if they just-- they bomb one thing. They figure, well, I guess I better drop this class. So what I've discovered

when I do this is that grade distributions-- they might skew slightly higher under this scheme, because students have more chances to prove themselves.

But what's been most useful about all this is that when we've done it-- I mean, I've done it and some of my colleagues have done it. And so we do see lower drop rates. I mean, so for example, one of my colleagues did this in calculus.

And she started with a hundred students in a flipped classroom, which is too many. But we've done it. And I think she had three students drop. A 3% drop rate is phenomenal. And again, it's because this idea that it just feels more possible and more nurturing. It's not so high stakes at any given turn.

Alexandra

It is the idea that any skill is within reach, that any skill is achievable for students. That makes it so different than other types of testing. It removes the added barrier of anxiety that high-stakes, one-shot exams often produce in students.

Kevin Knudson

I don't like high-stakes tests. Nobody does. Well, I mean, some people don't care. Some people don't think about it, like, well, this is what we do. So we've always done it. We're just going to keep doing it this way. And students are kind of used to it. And they stress about it, but-- and more and more-- and you've probably noticed this too in your classes.

I mean, more and more students are registered with the DRC for things like test anxiety. We can talk about that as much as we want, but it does exist. And so we have to begin to wonder. I mean, why do we do this to students, right? I mean, they stress out.

They're so-- I mean, of course, grades are too much a part of the academic culture, but it doesn't have to be that way. And if we can sort of take the high-stakes aspect out of it, then there's really less distress about it. I mean, now to be fair, I mean, I say there's no stress in my class. Yeah, there is. Sure there is.

Because once a student has not mastered something three times and they're on their fourth attempt-- and I generally-- I say at the beginning, you have four attempts. OK, they're starting to stress a little bit. However, they're just stressing about this one little concept, instead of this whole test where they don't know what's going to be on it.

It's four weeks of material. And there's going to be problems from this, that, this, that, this, that. It's overwhelming. It's so much to do. And sort of the other downside of high-stakes testing is once you leave the university, you're not going to be in high-stakes tests.

To be sure, there are certain professions where you are going to have to perform in high-pressure situations. But I'm not really sure that taking a test prepares you for those sorts of things. I think all they do is to sort of stress everybody out and kind of make-- turn students off to learning.

I mean, coming to the university should be mind-expanding, right? I mean, we should be modeling this idea of intellectual curiosity and trying to get our students to see that-- I mean, yeah, you're here. This is just four years. You're never going to stop learning. And there are going to be tests about it later.

And I think when we put too much pressure on-- or too much emphasis on the testing, then it becomes this thing where students just cram, cram, cram, or vomit it out onto the paper. And then they forget about it. And what was gained there? I don't know. So standards-based grading is at least one method to try to deal with that.

Alexandra

My husband is a physician. And in the last century, he was in medical school. And one of his most distinct and traumatic memories was the stress and anxiety of the once-a-month Saturday, all-day exams that covered all of the material they had learned in the previous month.

All the students would cram all day and night, filling their minds like overstuffed balloons that would deflate instantly as soon as the exam was over. Whether in math, or medicine, or any other field, testing and assessment that builds on learning and adds to learning is invaluable.

Kevin Knudson

The adaptability to other fields-- it's certainly no problem. It's easier in more quantitative or scientific things, where it's easier to discretize your syllabus, right? In other words, OK, I want you to know how to be able to discuss this kind of chemical reaction, or you need to understand Maxwell's equation for electromagnetism and all this stuff.

I hope I got that right. Haven't thought about physics in a while. It's sort of the relationship between electricity and magnetism through a wire, and the current, and the magnetic field, and all that stuff. I mean, that's a discrete thing that you can talk about.

Or in biology, you can talk about various things. That said, I mean, I think in the social sciences and the humanities, you could still do this. I think you have to-- and truthfully, I think it goes on a lot more than people realize. It's just not stated as such.

Once you identify the key things that you want your students to come away with, then you can probably-- and I can imagine-- in a humanities course, for example, there's certain themes that you might want them to be able to demonstrate knowledge of. And you could probably do those

with some sort of small assessments. I mean, you tend to have larger writing projects where that's the synthesis, so there's two aspects, right?

There's sort of the gaining of knowledge. That's Bloom's Taxonomy business, right? Even in a humanities course, there is core knowledge that you want them to get. And you can assess that. And then there's the synthesis part that probably isn't quite as-- but you don't want them to break it apart. That's the whole point. You're putting it together.

So even in mathematics-- even though I break it into these things, the truth is some of these other standards that I assess-- that's where the synthesis is. Because being able to solve an applied optimization problem is going to require, first of all, that you understand what the derivative is, that you can calculate some of them, that maybe the functions involved are kind of weird.

Can you set up the problem correctly? All these things-- you really are pulling it. It's word problems, right? And you know how students are. Well, maybe you don't, but I do. They'll say, are there going to be word problems? My answer is - life is a word problem.

So get used to it. So I think it's entirely possible to at least have some portion in any discipline done in this way. I think you have to think about what those kinds of things that you can individually assess in sort of smaller, discrete chunks are.

And then make it 20% of the grade or whatever you feel is appropriate. But it's still a nice way where students can demonstrate. And maybe they don't understand it the first time around. And they might have to revise and resubmit just-- which is essentially what goes on a lot in the humanities.

Alexandra

Standards-based grading can work in other fields. But how does it work for the faculty who are trying to implement it in their classes? What is that experience like?

Kevin Knudson

As far as how much work it is-- yeah, I'm not going to lie.

[LAUGHTER]

It's a lot of work. Now, so the first time I did this, I had one TA. And she was an engineering student. Engineering was helping to support this. And I mean, she was great. She had done this before as an undergrad. And so we had-- I kind of had too many standards. I had 25, which in retrospect was sort of too many.

But I had sort of core ones and then advanced ones. And so to pass the course, you had to master all the core and then certain number of the advanced to get various letter grades. And my TA worked very hard. She had office hours all the time. We allowed four attempts at each assessment.

So you have to track how many times each student has taken each assessment. So that's a massive spreadsheet you have to keep up with. You have to grade all of those. Now, luckily, they're pretty quick to grade. I mean, any given assessment would have three or four problems, sometimes only two if they were more complicated.

But with 100 students times 4, is 400 times 25. That's a thousand pieces of paper, potentially, that you have to grade. Hopefully, they master stuff early so that you're only grading one or two attempts at everything. But yeah, it can be a significant amount of work.

Alexandra

Standards-based grading is a lot of work. It's an investment, one that requires significant planning to be successful.

Kevin Knudson

So logistics of, how do you do this? When do you do it? Because you could imagine a scenario in which this kind of takes all your class time if you don't plan properly. Luckily, we do some four-credit courses where they meet with me three days a week and the TA one day a week. So the TA one day a week is an obvious time for doing these assessments.

But you can't do that many-- 2 in a 50-minute period. Maybe three. And so it gets to be a bit of a logistical mess, just trying to keep that straight. Now, some of my colleagues have done it. I was the first one to do it in our department. And so I was just trying to figure it out as I went.

I think some of my colleagues since then have streamlined it a bit more to where, OK, we're going to have assessments on this day. And these are the ones that are available. That's it, whereas towards the end of the semester, I was kind of making everything available. Well, because you had to, in some sense. Because some students really do master some things.

I was laying everything available. And I'd have to lay out 25 pieces-- stacks of paper at the front of the room. And students would come. And we'd have evening assessment times where we'd have-- here's two hours. Let's do it. Here's three hours on a Sunday afternoon. Just come and do it. But I still believe it's worth it.

Alexandra

In the end, both TAs and students agree that the effort was well worth it. And there are ways of streamlining the process of standards-based grading.

Kevin Knudson

So I've had TAs who are now teaching their own classes. And they want to do it this way, because they recognize the value of this method for their students. And yeah, it's worked. But they've figured out-- they're smart. They're smarter than I am. They figure out ways to streamline this. And it's proven to be rather successful. And the students like it. And I think everybody walks away with a more positive feeling about it.

Alexandra

That positive feeling is really valuable. In fact, it demonstrates how dedicated Kevin is to seeing students succeed, even in the most difficult classes.

Kevin Knudson

Math is the one subject where it's acceptable to say you hate it and you're no good at it, right? And I think part of that is precisely because we have high-stakes tests. We have-- it's all or nothing. It seems like this random collection of rules and algorithms that you're just supposed to memorize them and do them which is, of course, not at all how mathematicians think about anything. But if you can eliminate that sort of high-stakes arbitrariness that it often feels like, then I think you begin to get students to see that, oh, well, maybe I can do this after all. That's really the whole point.

Alexandra

Thank you for listening to this episode of the Beyond the Podium Podcast Series. 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.