

## From the AP Statistics Electronic Discussion Group, Summer 2015

A new post was added by Ted L Miraglia:

[https://apcommunity.collegeboard.org/group/apstatistics/discussion-boards/-/message\\_boards/view\\_message/65972181](https://apcommunity.collegeboard.org/group/apstatistics/discussion-boards/-/message_boards/view_message/65972181)

Need Advice & Help!!!

Just got my student results for this year (2015) ... and I was shocked at how poorly they did. I just completed my second year teaching AP Stats ... and believed I prepared my students better this year than last year. I understand the curriculum better ... instituted more activities and teaching strategies from two AP Summer Institutes I attended (2013 & 2014) ... increased the number of actual released AP Exam questions used on tests/quizzes ... spent a lot of time modeling good free response solutions. And yet ... the results were not what I was expecting.

I'm just at a loss as to how poorly my students underperformed. I want to make changes ... but don't know where to begin. On a brighter note ... I DO believe my students learned a lot this year ... but obviously it didn't show. Looking for some advice.

Ted

Ted,

I haven't gotten my students' scores yet and won't until tomorrow. A lot of people will have their own advice for you, but as someone who's been teaching AP Stats for 6 years now and as someone who was an AP Reader for the first time this year, I have a few points I'd like to make.

- 1.) The scores belong to your students, not you. No matter what you do to prepare them, you are not taking the test for them. They need to learn and demonstrate that learning.
- 2.) I'm sure you are on a steep learning curve for the content yourself. AP Institutes are great, but then it requires implementation. I've now been at it for 6 years but it really took a good 4 years to feel competent and confident and get into some sort of real stride. That said, I still email my guru with occasional questions (and usually answer them myself in the process--*now*). If there are ever any questions about even presumably nitpicky detail oriented stuff, ask your guru or ask the discussion board.
- 3.) As a teacher, I have a fair sense of what my students know. I know what they are trying to say and often interpret the solutions they write in that context. It's tough to be objective and grade on the actual words they are writing without any assumptions as to what they mean. The AP Readers intentionally attempt to score objectively based on exactly what is written. 850 of my new and now closest friends wrote the rubrics, were trained on the rubrics, argued the rubrics, and amended the rubrics (sort of) even as we scored the exams. There are a lot of students who clearly know their statistics and cannot communicate clearly what they know. The rubrics really are nitpicky and can nitpick on different things depending on the intent of the question and a bazillion other variables. But ultimately, clear communication is a key. In order to better understand this point, apply to join the reading after your 3rd year of teaching. It can only help you better understand the scoring process which will help you prepare your students.
- 4.) If you can, have your AP Coordinator order test booklets to be returned. Then you can do

your own item analysis of free response questions. They should have the information in their AP Coordinators' manual. They can request *all* test booklets back for *all* subject areas for a single price. From the 2014-15 manual it states, "The fee is based on the number of booklets received by the school: \$60 for 1–20 booklets, \$120 for 21–50 booklets, \$180 for 51–100 booklets, and \$300 for more than 100 booklets.

The deadline for ordering booklets is September 15, Schools will be billed in late September, when the orders are processed. The booklets are sent to schools between October and January."

5.) Whether you get the exam booklets back or not, look at the scoring notes (Student Performance Q & A) which is on the College Board web site under the scoring section. They will post the Q & A from this year's exam when it's ready.

[http://apcentral.collegeboard.com/apc/members/exam/exam\\_information/8357.html](http://apcentral.collegeboard.com/apc/members/exam/exam_information/8357.html)

6.) Ultimately, the biggest lesson I took away from this year's reading was "clear and unambiguous communication (with all appropriate wiggle words in place.)"

7.) Keep at it and don't take it *too* personally.

Mary Paulson

Ted:

As you note, the most important thing is that your students all learned much about statistics this past year. Mary has many good suggestions.

I would add that it would be helpful if your students could write one or, even better, two full-length exams that are the same format as the actual AP exam (perhaps the secure exams). There is no substitute for sitting in a classroom for over three hours doing statistics. Marking these exams carefully and applying the cutoffs to award scores of 1 to 5 allows both you and your students to know how prepared they are.

My students write one practice exam on a Saturday morning from 9 am to 12:15 pm and another on a Wednesday evening from 6 pm to 9:15 pm. I usually reverse the order of the multiple choice and free response for at least one of the exams (and I know that means that their experience is not an exact duplicate of what they will experience in the real exam); this reversal allows me to start marking the free response while the students write the multiple choice; also, I allow students to leave early if they complete the multiple choice early (and most do complete and check the multiple choice early, whereas all of my students use their full 90 minutes on the free response). Some richer schools provide pizza before, during or after the practice exams (I usually have food of some sort for the break between the multiple choice and free response).

I always give two full-length practice exams and the first is usually a wake-up call to students and motivates them to study more and helps them focus their study time. Almost all students do considerably better on the second practice exam. These two sessions help reduce test anxiety to a negligible amount for most students on the big day. Without the experience and feedback from these two exams, I know that many of my students would lack the confidence that helps put their brains in the optimal state for doing math on the big day.

I haven't gotten my results yet, but in past years, the results have either been exactly what I would expect or better. The two practice exams give me a very clear picture of what my students are capable of. AP Statistics is much tougher than I had anticipated prior to teaching it (and I still too often underestimate the careful reading and finely nuanced thinking and communication required of students). Marking the AP Stats practice exams is usually a discouraging experience for me (unlike my AP Calc exams which is usually surprisingly positive), but a helpful one. As I mark, I often feel that the rubric is rather miserly with how it assigns a score of 1, 2, 3, or 4 to each free response question, but I stick with it, so that my students and I get an accurate idea as to what score they can expect on game day.

I count the higher of the two marks from the practice exams as a final exam mark to encourage students to take them seriously and to prepare for them.

One other thing that I do that helps that hasn't been mentioned (I got this idea from Josh Tabor at a Summer Institute): Just prior to Christmas holidays, I give the students a set of about 15 to 20 free response questions along with the solutions and tell them that part of their January midterm will consist of 4 questions randomly chosen from these. This encourages them to read the questions and their solutions very carefully which helps them develop a sense of what constitutes a good response. Some students attempt to memorize the responses, but I know that to do this with any degree of efficiency, they must thoroughly understand the questions and the responses. In January my students are still far too weak to successfully attack AP-difficulty free response questions. They would just flail around aimlessly drowning in words and numbers, so this gives them the scaffolding/support that they need in order to develop their comprehension sufficiently in order to experience success.

As Mary notes, the scores belong to the students. If your students have difficulty reading (as mine do) and have not developed their motivation and study skills (mine are better here), then good scores will be elusive, but learning won't be.

Cameron Milner

Hi Mary—

Here are the instructions and the list of problems I use for my semester 2 midterm. This occurs after Chapter 9 in TPS 5e—confidence intervals and significance tests for one sample. I like using an investigative task for the 4th question, with 2009 #6 being my favorite.

Josh Tabor

Problem Set for Midterm: From the following questions I will choose 3 for you to answer on the midterm, along with a mysterious 4th question. I will not be collecting these problems, but you are welcome to ask me about them at the end of class (when there is time), during tutorial, or afterschool. The rubrics for these questions can be found at the following website:

[apcentral.collegeboard.com/stats](http://apcentral.collegeboard.com/stats) (click on AP Statistics Exam information). Good Luck!

1. 1999 #1 (Commercial Aircraft)
2. 2003B #2 (Age vs. Income)
3. 2004 #3 (Brontosaurus)
4. 2004B #3 (Bauxite cars)
5. 2005 #4 (Cereal coupons)
6. 2006 #1 (Catapults)
7. 2006B #3 (Golf balls)
8. 2006B #4 (Dexterity)
9. 2006B #5 (Tractors)
10. 2010 #3 (Humane Society)
11. 2010B #1 (Polluted Rivers)
12. 2011B #2 (Fear of heights)
13. 2013 #1 (Crows)
14. 2013 #3 (University appearance)
15. 2014 #2 (Convention attendees)

Good Afternoon Ted,

Congratulations with respect to having completed year two as an AP-Stats teacher. It takes several years (4-5) to become truly proficient thereby allowing the students to reach their potential. The advice in the other responses is right on target--do not take it personally because the students own the scores. After teaching the class for 10+ years and serving as a Reader for the past five years I have found the biggest factor impacting students' scores is student motivation. As such I start each school year with a heart-to-heart motivational discussion as to why the students are in an AP-Stats course. I share with them an excerpt from the book: "Born To Run" regarding "The Beast;" (*Lisa Smith-Batchen, the amazingly sunny and pixie-tailed ultrarunner from Idaho who trained through blizzards to win a six-day race in the Sahara, talks about exhaustion as if it's a playful pet. "I love the Beast," she says. "I actually look forward to the Beast showing up, because every time he does, I handle him better. I get him more under control." Once the Beast arrives, Lisa knows what she has to deal with and can get down to work. And isn't that the reason she's running through the desert in the first place – to put her training to work? To have a friendly little tussle with the Beast and show it who's boss? You can't hate the Beast and expect to beat it; the only way to truly conquer something, as every*

*great philosopher and geneticist will tell you, is to love it.*) We talk about how the AP-Exam is like the Beast and getting to "the fight" is like an ultra-marathon. I tell the students this will be their opportunity to see where they compare with the best students in the world--not just my high school. I remind my kids they chose this class, an elective, it's not required to graduate so if you are not here to put forth 100% of your effort please see the counselor and I will be happy to give my consent in terms of dropping the course. Once we have the motivation behind us we hit the skids running--we work hard and fast and finish the curriculum no later than mid-February; leaving approximately 10 weeks to review and engage in practice FRQ & MC exams. We also use the 5-Steps-To-A-5 booklets. As we go through the review process the students see their weaknesses and I encourage them with the term: "we are closing gaps." The students know the MC section of the exam is two minutes per question and each FRQ question must be completed in under 13 minutes; with the exception of number six at 25 minutes. We practice like we play in that everything is timed. Lastly, test taking strategy: I have the students read all six FRQ questions when they receive a test, making notes as they read each question. They then choose a strategy in terms of order done--easiest/fastest first, followed by second easiest/fastest, etc.; always going to Question Six within the first 45 minutes of the FRQ section. We perform this ritual during our practice tests so they have it down the day of the exam. Hang in there Ted, you are on the right track--have patience with yourself but have a sense of urgency with your students.

Vaya con Dios!  
Doug Martin

Mary:

Yes, I teach on a traditional schedule (either 48 or 65 minutes every day, but because I have to get my students through another mostly unrelated math course before the end of June, I don't get to start AP Stats until mid-October; I finish that other course in May and June after the AP Stats exam). You are correct that by the midterm at the end of January we are just starting sampling distributions and have not started inference, so the free response questions that I give my students cover only what we have learned: data collection, data description, and probability, excluding sampling distributions.

Unlike Josh, I do include the intent and solution in the handout (but not the scoring guidelines) because I fear that many of my students would not be motivated or organized enough to look up the solutions online. The scoring guidelines can require more reading than many of my students would be willing to do (and more paper than I should be photocopying).

Douglas: Thanks for sharing the "beast": great idea. I agree that motivation is crucial. Whatever we can do to increase desire will go a long ways.

Cameron Milner

Thanks to Mary, Cameron and Doug ... I greatly appreciate your insights and your "cheerleading".

All I want is to give the students entrusted to me the opportunity to reach their full potential. I know we shouldn't judge our "worth" as educators by the results of a single test ... but you want your students to do well ... and when that happens you experience some satisfaction "of a job well done."

I'm already thinking about next year ... and will look to implement some of the strategies outlined. If anyone else has more to add ... I would welcome the advice. This is my first post ... and hopefully not my last. I already feel welcome here. Again thanks!

Ted Miraglia

Thanks for the advice that those have outlined above. I also finished teaching the course for the 2nd year, and my results were better than year 1 (my pass rate was just under 80% but just over 50% of those were 3s) but still not as good as I would have hoped. I tried to really incorporate a lot more free response questions throughout the year and going over the scoring guidelines each time which I think was very helpful. Now I have more tools to use for next year, I just need to turn the corner and get those 3s to become 4s and 5s, so if anyone has the secret for that...

Andrew Rosenbloom

Josh and Cameron:

All cleared up now, sort of. Josh, you give the problems at approximately the end of 3rd quarter (semester 2 midterm) while Cameron gives the problems at the end of 1st semester in January! So many choices!. Good strategy, Josh and Cameron.

After reading this year for the first time, I am going to be working on the skill of reading what *they have written*-teaching students to read and evaluate their own and others' writing. This leads to a sort of hybrid strategy, slightly different from either Josh or Cameron.

1.) Assign many (but not all) of the problems you mention as we go along and cover relevant material.

2.) Transcribe student responses to copy and hand out-more work for me but less paper copying-and more readily reusable!

3.) Do their own clarity (and completeness) analysis of the responses in small groups and ending with large group discussion.

4.) Assign some of the selected problems as part of a semester exam or 3rd quarter exam.

5.) I will likely (note use of wiggle word) add a problem to the list: 2015#1 (Accountants boxplots). I spent 5 days scoring this so have a *really* good sense (and lots of student samples already) of good and poor responses. I had too much time on my hands one day and transcribed the sample responses from our training packet. I will attach here for general use.

Side note:

Thank you for your willingness to share ideas and materials. That spirit of ego-free (relatively) sharing and collaboration is part of the reason that we become "BFFs" at the readings.

Mary Paulson

Ted,

I remember all too well. My first year, I have no idea how, my students passed. My second year the results were horrible. I questioned myself. I took a couple of day AP classes and then after my third year, went to an experienced teachers week in the summer. It was a different experience. I read everything on this board too. The third year my scores were good and this year was even better. I find you have to figure out what the questions really want. I am lucky in that I have some great opportunities for my students to have some speakers from colleges that are graders come to my class and give pointers towards the end of the year, my students go to a review class, and they have a practice exam that I require my students to attend. They go into the exam prepared for the exam. I can teach them the material but I can't give them the experience of taking an exam like this in my classroom. I would suggest looking for similar opportunities. This year I read too. That was the best professional development I have had to date. Do remember - do not doubt yourself- we have all been there and it is frustrating, just show your students you are committed and you expect the same from them. The fact that you want better for your students shows you will have success- it really does take 3 years though. Hang in there you are almost there.

Susan Owens

Ted and others,

Hang in there as each year gets better. The first couple years are about survival.

I like to say my students' scores were good at the start in spite of their teacher and now they are good with help from their teacher.

Tips that I live by are

- A) be picky regarding proper language from day one and nail them often
- B) have assessments that spiral by including early topics
- C) give students frequent opportunities to show growth ( I allow test retakes)
- D) keep a steady but pretty brisk pace; I try to have all of April to review

These have worked well for me as I usually have a pass rate close to 90% each year. Keep pluggin!

Mike Griffith