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Teaching Students How to Write AP Statistics Exam Responses



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Turning Insights into Solutions

As students work through the free-response questions on an AP Statistics Exam, they are asked to respond in a variety of ways. Some of the questions are fairly straightforward, and a student with the requisite knowledge of statistics usually responds well. But there are other, more difficult questions with which students find it difficult to turn their perceptive insights into effective solutions. In the present article, I'll look at some of these types of questions, explain why they are difficult for students, and suggest some strategies that can help students express their ideas more clearly and successfully.



A common type of problem asks students to reach a conclusion or make a decision based on some statistical evidence in front of them. Some students know exactly what to do with these types of questions, but others struggle, even though their statistical knowledge may be more than enough to make correct decisions about the problem.

The writing needed to complete a response to these types of questions is a little different than much of what students are usually asked to write. It is not like a typical essay assignment where students have to develop a thesis, offer supporting evidence, usually from a number of sources, and wrap up their work with a concluding paragraph. In writing an essay, they usually have the luxury of time to work on revisions and editing. It is also not quite like the typical short answer question that they are often given, where a few words or a phrase might suffice to answer a very directed question. The writing task is somewhere in between, more than a single idea, but not needing the extensive development of an essay.

Practical Steps for Students

So what should students do? First, let me propose a format for a concise paragraph that gives students a framework on which to hang their responses. Such a format can help guide students in writing what they already know in a clear and coherent form. Many students have been taught a method for dealing with essays, perhaps the five-paragraph essay format, which helps them organize their composition. Many students have also learned to structure a response to a hypothesis-testing question on the AP Statistics Exam, and this guides them through the necessary steps much more successfully than they otherwise might. Having a framework for the "explain your answer" questions can be similarly helpful.

As the first step, students should make sure that they clearly and unambiguously answer the question posed. Every year that I have been a Reader for the AP Statistics Exam, I am amazed at the number of students who fail to take this first, sure step. They either assume you know what their answer is and begin with supporting evidence, or they just begin writing, unsure of what the answer is until they have written enough to figure it out. It is not a waste of time to stop and think! Read the problem carefully, reach a conclusion, think again about your conclusion, and write it down. It may be helpful at this point to underline or circle the key phrases or clues that lead them to their conclusions.

The next step is to present evidence that supports your conclusion. State the facts in the problem that support your conclusion. Use the underlined words or phrases, as they often provide the correct language. There may be several facts presented in the problem that are pertinent. If so, it is best to decide which are the most relevant and quote those first. There may also be some parts of the problem that push towards a different conclusion. It may be a judgment call as to which wins out; if there is contradictory evidence, it is helpful to mention this as well. The final and indispensable step is to connect the facts -- which you have written down as supporting evidence

-- to the conclusion you reached. You must also state why the facts you have quoted led you to the conclusion. If you have quoted some contradictory evidence, then part of your explanation should be why your chosen conclusion wins out. At least some part of this connection, if not all, is usually some statistical concept that you introduce into the solution that provides necessary linkage. It is this unveiling of the necessary concept that really brings home your point forcefully (to the delight of the Reader!).

This final step -- making the necessary connection -- is where many students lose credit in a situation in which they fully understand the problem, have identified a correct conclusion, and have presented the correct supporting evidence. The Reader will judge the response complete when it also contains an explanation of why the facts that are quoted support the conclusion. Too many students leave the conclusion and the evidence disconnected, and most scoring rubrics will demand that they be explicitly connected to receive full credit.

Common Question Prompts

Let me specifically address two common question prompts, which are variations on the type of question discussed above. The first variation asks students to make a choice between two alternatives. Some students will make a correct judgment and write eloquently about the strengths of the favored alternative, addressing the three parts outlined above: They state their choice, they present sound evidence, and they explain why the evidence supports their chosen alternative using a valid statistics concept. But in these comparison problems, a common mistake is to only address one of the alternatives. If faced with a comparison and choice, students must do two things: 1) explain why their choice is strong, and 2) explain why the other alternative is inferior. Scoring rubrics consistently demand both alternatives be considered to get full credit, and the format above can be used to guide the response to each part.

A second type of question prompt that is a variation on this theme is one that includes a phrase like "using your answer to part (a), explain why...." On these questions, it is essential that the evidence stated includes or references the preceding answer, either by number or concept. The final linking step must also relate this answer to the key statistical concept of the problem if full credit is to be awarded.

Here's a summary of the method that I recommend to my students:

1. Read the problem carefully, and think about the question. Do you know the correct answer? Are you sure? Do not second-guess yourself, but be careful not to jump to conclusions, either. **Write down your conclusion in a single, straightforward sentence.**
2. What evidence do you find in the problem that supports your answer? **In several sentences at most, provide the details of the problem setting that are relevant.**
3. Why does the evidence you state support the conclusion? **Using an appropriate statistical concept, show the connection between your evidence and the conclusion you reached.**

I also make an analogy that helps many of my students who are familiar with how criminal prosecutors operate through various popular television shows. As a prosecutor makes his or her case, there are similar stages to go through. First comes an opening statement where the lawyer will claim that the defendant is guilty, then a stage where evidence which incriminates the defendant is presented, and finally, a closing statement where the prosecutor makes sure that the jury sees how the evidence presented affirms the claim of guilt that began the trial. These are the same three parts of the method discussed above.

The Importance of Good Writing

Along with the difficulty that students often face in making their writing clear and succinct, there is a second challenge: Many teachers of AP Statistics are not accustomed to teaching students to write. Most have come to teaching statistics from teaching mathematics. They are often not very experienced in teaching students how to write and may not themselves be confident writers. If you find yourself in this category, I hope that you can find colleagues at your school who may be able to help you. Think of successful history, social studies, or science teachers. Their tests and quizzes more routinely include examples of questions that demand writing similar to that used in AP Statistics, and they can often be useful coaches and allies for you.

See also...

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