SCORE MODULE AE RECOMMENDATIONS

Module: Boston Marathon – Jack Fay

AE: Rod Sturdivant

Recommendation: revise with major revisions (largely major in terms of ISLE/engagement and video)

AE Comments:

* Both reviewers liked the data and statistical topics.
* Need a video (our industry reviewer is a marathon runner and would likely do this)
* Both reviewers identified the same bigger areas to improve:
  + Motivation of the problem (sports and statistics) more clearly
  + Skewed data implications
  + Increasing engagement opportunities for students (“ISLEizing” might help with this)
  + Concluding the module to clearly describe how the stats were connected to addressing the problem
* A few other minor suggestions were included that should be addressed (see reviews)

Reviewer comments (selected):

* Industry reviewer
  + Purpose of the module, clear explanation of the sports question needs to improve. Is it to identify gender specific performances in relation to distributions of times? Is it to identify the distribution of times and then understand if top finishers are actually outperforming the masses of Boston?
  + After generating the histogram at the start of the worksheet and identifying the distribution as Right skewed, it seems like perhaps the questions should then focus more on skewed statistics rather than normal distribution statistics (z-scores, std deviation, etc.). Perhaps an opportunity to interject some knowledge on calculating skew and the purpose of Q1, Q2, Q3 in these cases. Variance is good to have as an opportunity to describe just how variable the times are, but perhaps ask a question about why the variance being so large affects decision making in understanding the distribution of finish times. Maybe ask about comparing mean to mode and median and how this relates to the skew present. This then serves as an opportunity to explore outliers - i.e. is the skewed distribution ACTUALLY skewed or do you have outliers present. If outliers are present, then perhaps develop a box plot with outliers identified and recalculate if skew is present. Then move on to z-score type questions (gender questions).
  + When moving to gender specific top finishers it would be good to supply a histogram for both subsets. Are they normally distributed or do they follow the same distribution as the "population?" Calculating z-score without the assumption of normality or a histogram present (after seeing that the pop. histogram is not a normal bell curve) should open the door to display importance of considering distributions before comparing statistics.
  + Similarly, conclusion could better revisit the problem and why it is important, as well as why the statistical methods helped address the problem.
  + Minor comments: - Q2 answer key is incorrect - Q6 answer key has 330min in the answer text, but question was for 405min
* Pedagogical reviewer
  + Similarly notes issues with clearly motivating the sports question and statistical method. The “motivation” section is difficult to find (it’s in the data\_description.qmd). Similarly, the “Questions” section at the bottom of that document seem important for the motivation – I’d make these more central.
  + Fun data! I especially love the z-score application in Q8 – Q10.
  + The question “What summary statistics are relevant to examine for finishing time?” is posed but then not explicitly addressed in the activity. I would argue the answer to this question requires you to consider the distribution of the data: because it is skewed, the median and IQR are probably more appropriate summary statistics than the mean and standard deviation (the former are robust to outliers, the latter are not). I’d suggest asking the above question explicitly in the activity, including a question about median, and excluding the question about variance / standard deviation. The addition of a question about median would help support the 2nd learning objective (currently nothing is asked about the center of the distribution).
  + I would suggest grounding the “fence / outlier” questions in a similar way by connecting the datapoints (e.g. 405, 115) to actual runners in the data, to make it concrete for the students.
  + Add in some more exploration questions that get students to engage with the data itself (even if just viewing it in a spreadsheet) and get curious about what other questions could be asked/answered from the data.
  + Minor comment - the data appears to be measured in minutes, but the first question says it is measured in seconds.
  + I don't see the "level" of the module clearly stated, assuming it's for an intro course. I was unfamiliar with the "fence" language (usually hear it referred to as "whiskers" on the box plot), but by the formula I was able to discern what it was. Might consider saying "deviation from the mean" to be explicit what it is being asked for by the "deviation" in Q2.