Using Self-assessment inventories to provoke classroom discussions

Self-assessment inventories typically consist of a series of statements to which we are invited to respond with an integer from 1 to 5 in order to indicate how strongly we agree or disagree with the statement. The data themselves provide students with a chance to work with ordered, categorical variables in a way that is fairly realistic, and also quite likely one of the most common instances of categorical variables in the research literature.

In our breakout session we will examine an inventory designed to help you assess your approach to teaching statistics. We modified this slightly so that it could be given to your students and used for them to assess how they learn statistics. This items are not meant to suggest a right or wrong approach and, indeed, may be substantially flawed! They are meant to identify certain characteristics the students might not have known about, and, more importantly, to provoke discussion about how such inventories are constructed and other statistical issues.

Usually, the statements (called items) in an inventory are organized into clusters, and each cluster is meant to measure a different aspect of a person. This aspect is called a construct. For example, in our student self-assessment inventory, one construct claims to measure "your perception of the role of the student in learning statistics." This cluster consists of 5 items, and students are asked to add their responses to these 5 items and report the total. When they are done with the quesionnaire, they will have, in addition to 15 responses to the individual items, 3 totals for each of the three clusters, and one "grand" total.

These scores can be used to help with ideas about distributions. What distribution do they think they will see for item #1 or item #2? How will this compare to the distribution for cluster #1? To the grand total? Which distribution should be the most symmetric, and why? (This can lead or follow a discussion of the Central Limit Theorem, and, more importantly, to the assumptions behind the CLT. Do these assumptions apply here? Students should be encouraged to make predictions about what shapes they expect to see, and then check them by making pictures of the distributions with the available data.)

Students, and humans, are naturally eager to compare themselves to others. Unlike, say, height, where we have a clear understanding of what it means to be 3 inches shorter than someone else, it is not clear what it means to be 3 points below someone else on construct #2, for example. And it is not clear how we should compare scores on construct #2, say, with construct #3. This leads to a discussion of z-scores, and students can construct their own z-scores for the cluster scores and the grand total, and compare their standing to others in the class.

Finally, with more advanced students, these can lead to rather serious and "deep" discussions about the validity of these constructs. (This has been a matter of debate for at least a century, now.) One the one level, they can argue about whether the constructs even "exist", and whether or not they are useful. On another level, they can discuss whether the items are actually measuring the construct they claim to measure. They can then discuss means for verifying this with data, or with further experiment. Stephen Jay Gould's book The Mismeasure of Man provides a historical and cultural overview of the abuse of such questionnaires, and the exposure this questionnaire provides might help students understand some of the thornier points Gould raises.

Students beyond the introductory level can learn about measuring associations with non-continuous variables, and what these associations might mean in terms of the validity of the items and the constructs. They could also learn how "correspondance analysis" might help them detect "types" of people based on their pattern of responses.

Self-measurement, whether through a questionnaire or less formal means, is an increasing part of our internet-based, web culture. We hope this breakout serves as one step in helping us discover ways for statistics to help students learn about themselves and for knowledge of oneself to help one learn statistics.

Dennis Pearl