TEACHING STATISTICAL LITERACY TO NURSES

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Practicing nurses, especially those associated with research facilities, may come highly motivated to a course which addresses issues in biostatistics and epidemiology. This likely motivation is a result of being aware of the importance of understanding medical research and possibly even having participated in a research project. Nurses whom I have taught at the University of Kentucky are such a group. They appreciate how important it is for a nurse to be able to properly evaluate medical research while some of the students have participated in studies with which I have also been involved. The stage is therefore set for a rare opportunity for a statistician to teach a class where students are initially motivated.

But the nurses do have .the usual mathematical phobias one often encounters. The students may have a desire to learn about statistics but are still scared to death at the prospect of actually taking a statistics course. The challenge is to alleviate the fears and then build on the natural motivation.

The first class period becomes critical as the groundwork is laid for the course. Easing mathematical anxieties is essential and it must be done on the first day. Students need to be assured that interpretation of statistics, not manipulation of data, is to be emphasized. I propose that we cut the umbilical cord which has too long tied mathematical symbols to first courses in statistics. As my students peruse the semester's reading assignments, they do not see any Greek symbols. Assured of my intention to teach proper evaluation of the medical research which they encounter in their work and that I will expect little if any statistical calculations, students' anxieties begin to abate.

Do not confuse lack of mathematical symbols with lack of statistical content. In fact, more material can be covered –when time is not taken to familiarize students with the symbolism. As with most first courses in statistics, an early discussion of descriptive statistics (graphs, location, dispersion, and correlation) helps to "ease" students into the subject-matter. A subsequent discussion of sample surveys helps to bridge the gap between descriptive and inferential statistics since students can evaluate many surveys without understanding inference. After considering response rates, timing, methods of contact, the population sampled, and the wording of questions, we move into a discussion of the uncertainty of inferring to a population having studied only a sample from the population. Restricting attention to estimates of percentages, we then begin to discuss inferential statistics including the sampling distribution of the proportion, estimation and confidence intervals, and testing. Following a discussion of regression, we begin a detailed look at observational (retrospective and prospective) and experimental (clinical trials) human studies.

The key to keeping the attention of the students through these discussions is to present examples that they can understand and critically evaluate. Survey results provide particularly useful examples for most student groups. The nursing students' background in medicine can be a particularly important teaching aid. With their medical backgrounds, students are able to discuss the medical aspects of the examples which are presented while I discuss the analogous statistical concepts. For example, concern for the bias of participating nurses motivates a discussion of the need for double-blind studies. Students can invariably detect potential confounders, leading to a discussion of randomization, stratification, and proper selection of controls in human studies.

The key to success is to relate the statistical concepts to medical situations which the nurses understand. This is difficult to do if one insists on using mathematical symbols which represent a foreign language to the students. By presenting material non-symbolically,[1] you will find it a pleasure to teach students who want to learn about statistics. The students will surprise themselves by discovering that they can actually critically evaluate medical research.

If there is a drawback to teaching statistical literacy,[2] it's that it is more work than the traditional course which asks students to "plug" numbers into a formula and "chug" to a specific answer. Testing becomes more essay-like than objective; I've even found myself grading "term projects",[3] -However, if you're up to the challenge, I think you'll find motivated and interested students a just reward.

References

[1]Haack, D. G. (1976). A non-symbolic statistics course. Communications in Statistics. A5-10:43~947.

[2]Haack, D. G. (1979). Teaching statistical literacy. Teaching Statistics 1: 74-76.

[3]Haack, D. G. (1980). A note on teaching statistical literacy. Teaching Statistics 2: 22-23.

Reading List*

Bross, I. D. J. (1957), Scientific Strategies in Human Affairs: To Tell the Truth. Exposition Press.

Campbell, S. (1974), Flaws and Fallacies in Statistical Thinking. Prentice Hall.

Federer, W. T. (1973), Statistics and Society. Dekker.

Gallup, G. (1972), The Sophisticated Poll-Watchers Guide. Princeton Opinion Press.

Haack, D. G. (1979), Statistical Literacy - A Guide to Interpretation. Duxbury.

Hauser, P. M. (1975), Social Statistics in Use. Russell-Sage Foundation.

Huff, D. (1954), How to Lie with Statistics. Norton.

Messick, B. M. (1968), Mathematical Thinking in Behavioral Sciences. Readings from Scientific American. Freeman.

MosteIler, F. (editor) (1974), Statistics by Example. Addison-Wesley.

Reichard, R. (1974), The Figure Finaglers. McGraw-Hill.

Roll, C. W., Jr., and Cantrill, A. H. (1972), Polls: Their Use and Misuse in Politics. Basic.

Tanur, J. (editor) (1972), Statistics: A Guide to the Unknown. Holden-Day.

There is a version with health science examples only.)

Wheeler, M. (1976), Lies, Damn Lies, and Statistics. Liveright.

*Included are books with non-medical emphasis. The main criterion for inclusion in this list is that material be presented with little or no mathematical symbols.