

ASA Statement on P -values: Some Implications for Education

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Over the last 20 years there has been a phenomenal improvement in our approach to teaching statistics. Current texts emphasize the understanding of concepts and the use of technology, illustrated with real world data. However the vast majority of our introductory statistics text books teach null hypothesis significance testing as the definitive method (and the only method) for statistical inference, and many still recommend the default of a 5% significance level to assess the test results. This needs to change.

Introductory statistics courses are usually service courses for students in other disciplines. Only a minority of these students will implement statistical methods in their careers, but they do need to understand the statistical content of their reading. This content will include fixed level testing, so it is important to continue to teach an understanding of the approach, without advocating it, while clearly addressing the disadvantages. It is hard for students to grasp the concept of a p -value. While some texts have done an excellent job of listing the many misconceptions along with correct interpretations when first introducing the concept, it is important that we continue to reinforce the correct concept throughout the introductory course (and second and third courses!). We also need to make our students aware that p -values are not the “only way.” At a minimum we can include confidence intervals whenever we perform a test, to assess practical significance in addition to statistical significance. Ideally we would include an introduction to Bayesian methods.

Authors, you are in the perfect position to ensure our texts are in keeping with current statistical practice. An additional chapter to introduce some of the ideas for Bayesian methods

would be appreciated, and a book introducing Bayesian methods, suitable for introductory students with little quantitative background, would be a wonderful resource.

How can we implement change as teachers? First, within our own teaching. I have made some major changes in my lecture presentations and student activities as a result of my involvement with the ASA statement. Second, we can act as advocates. Start with your colleagues, encourage them to read and discuss the statement. Contact the publishers and authors of the texts you currently use, or texts you are considering for adoption, and request updates. New editions usually appear at regular intervals, and my experience has been that the authors not only appreciate feedback but actively encourage it—they want to satisfy the needs of their audience. Be aware of the exercises and the solutions provided when inspecting your text. Often the content and the worked examples have been updated and new exercises added, but the old exercises and their solutions remain unchanged. The instructor (and student) solution manuals are not necessarily written by the original authors, and the solutions left from earlier editions may no longer conform to current statistical practice. This is an issue not only for students, but for instructors teaching statistics for the first time who rely on such manuals as teaching resources. We need to keep publishers aware of our concerns.

I would like to thank the ASA for leading the discussion around p -values and developing the statement, and for inviting me to the October 2015 meeting. I have learned a lot, and am truly grateful

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