Developing Interactive Tools for Teaching Statistics to Psychology Students

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Of the many types of new technological tools available for teaching statistics, which ones will actually help students learn? Research suggests students will receive the greatest benefit only if the tools include structured interactions that encourage learning through discovery. The recently developed pencast and apps for iPhones and iPads are two tools that could be used to help students learn basic concepts in statistics. Through the APS Fund for Teaching and Public Understanding of Psychological Science, I developed several sets of tools which will be available at www.teachpsychscience.org.

Pencasts are paired audio and written PDF files created by digital smartpens. A smartpen records audio alongside handwritten text and converts the recording into an audio PDF. In this document, each pixel of writing corresponds to the audio portion recorded at the time of creation and pairs narration with a written document in a pencast. These pencasts are ideal for showing how to work through statistics problems. As the instructor solves the problem, she can narrate each step along the way. After attempting the problem on their own, students can listen through the entire pencast to understand the steps taken or can actively click on the sections that posed difficulty and listen to specific sections.

I piloted a set of pencasts in an introductory statistics course at Quest University Canada. Students commented that the pencasts were "easy to follow step-by-step" and that it was "good to have visual and audio components." The pencasts explained common statistical tests such as one-sample t-test, chi-

square, and ANOVA. The steps were slightly different from the ones used by the class instructor, and the students enjoyed seeing the variation in styles of applying the same test. With the students' suggestions, the pencasts were improved to be louder, slower, and better organized on the page.

The iOS apps also required interaction from the students to understand statistical tests. Right Stat is a free app from the Apple App store. Students are taken through a series of branching questions which help them think through their data to find out which statistical test is the most suitable for their research design and question. They are asked about the number of groups they wish to compare as well as the type of relationship they are seeking. Other apps in development allow students to input basic information about their sample and to see information about their variance and probability change as their parameters change.

I showcased both sets of tools in a conference presentation at the International Conference on the Teaching of Psychology in late July 2013. The attendees (psychology instructors who teach research methods or statistics at their universities) were enthusiastic about the possibilities these tools pose and were eager for more of them. They were particularly interested in seeing the iOS app adapted for Android and other mobile operating systems. The audience said that creating free resources and having interactive tools that could take learning outside of the classroom were particularly important. These tools have fulfilled that niche and will be available to help students better their understanding of basic statistical concepts.

References and Further Reading

Chiang, I. A. (2013, July). *Developing interactive tools for teaching statistics*. Paper presented at the International Conference on the Teaching of Psychology, Vancouver, Canada.

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