Interim Report for

Interactive Learning Tools and Demonstrations for Behavioral Science Courses

Developed through an ACS Summer Technology Fellowship awarded to

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Overview:

The goal of the present project was to develop interactive demonstrations and learning activity modules to accompany instruction in behavioral statistics and research methods courses. To the extent material in these courses can be made more concrete, many students will benefit as these abstract concepts are demonstrated via interactive visual displays. Though similar activities and exercises are available through some publishing companies and websites, these modules are usually a) associated with a particular textbook, so they aren't freely available; b) non-manipulable by instructors desiring a classroom demonstration tool; and c) present the material at a level of complexity appropriate for either classroom use or personal instruction (usually the latter), but not transferable for ideal learning in both environments.

Student and instructor versions of eight demonstrations were developed and housed online (see URL below). Student versions of the demonstrations lead students through a series of actions, providing context-based feedback at each step. Instructor versions of the demonstrations provide the same graphical displays and interactivity, but without the feedback. The intent was to provide students a step-by-step instructional experience, while allowing instructors maximum flexibility in how they might use the tools in a classroom setting. Instructor and student versions were intended to be mirrors of one another, with the student versions simply containing expanded explanation of the concepts. Specifically, this would allow students to follow-up course instruction using the same visual example the instructor used in class.

Accessibility:

All materials are housed at the following URL: http://personal.centenary.edu/~rmweeks/StatLAB/. Both student and instructor versions can be used through a Web browser, providing the browser is equipped with the appropriate plug-in (accessible through the website). In addition, instructors can download a .zip file with all instructor versions in an executable format.

The following interactive demonstrations are available:

1. **Central Tendency and Skew** - The relationship between a distribution's mean and mode as outliers become present.	2. **Power and Errors in Inferential Statistics** - The relationship between power, Type I errors, and Type II errors.
3. **df and the t-distribution** - The relationship between degrees of freedom and the distribution of t-scores.	4. **Calculating Effect Sizes** - The relationship between 2 distributions' means, standard deviations, and the calculation of Cohen's d.
5. **Examples in Factorial ANOVA** - Patterns of main effects and interactions in a 2 x 2 factorial ANOVA.	6. **Interactive Demonstration in a Factorial ANOVA** - Provides an adjustable 2 x 2 matrix so users can impose changes on the scores in the ANOVA matrix.
7. **Correlation Examples** - Patterns of positive and negative correlations.	8. **Least Squares and Regression** - Provides an adjustable data set for users to calculate a Pearson r correlation and observe the calculation of the least squared error regression line.

Intended Use:

The modules are intended to be supplementary materials for behavioral statistics and research methods courses. However, the basic elements of many of the demonstrations (e.g., t-distributions, main effects and interactions in factorial ANOVA, least squares regression) are universal statistics concepts applicable to inferential and descriptive statistics in a variety of fields.

Assessment:

Initial feedback from instructors has been very positive, though assessment using students has yet to occur. Assessment of the a) Usefulness, b) Ease of Use, and c) Clarity of the demonstrations is taken place with behavioral statistics students this semester (Fall, 2006), but the complete data set is not yet available. These assessments will be of students' perceptions of the demonstrations, but instructor feedback being available on only a preliminary scale. A final report will be available in December, 2006.