

Running Head: THE RELATIVE EFFICACY OF JAVA APPLETS ON STUDENTS' RECALL
AND REACTIONS TO PSYCHOMETRIC STATISTICS

CASTL Fellowship Final Report

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Project description

In an effort to improve active learning of psychometric properties, Java Applets and other visual aids were introduced as part of a graduate course in Creativity Assessments: Measures and Methods. Books such as Seeing Statistics by McClelland (2000) and Innovations in Teaching Statistics by Joan Garfield laud the efficacy of these tools. To add to the body of literature that supports this assertion, pre-tests and post-tests were administered to assess learning outcomes. A single instructor taught the same set of statistics in two ways to a class in the Fall of 2007 and then to a class in the Spring of 2008. Since this study was non-experimental, that is, control groups were not used, a qualitative study was conducted to support the Mann Whitney U test findings. The narratives suggest that Java Applets and visual aids had a positive influence on student learning.

Major results or findings of your work

This study examined the relative efficacy of Java Applets on students' recall and reactions to psychometric statistics. Although the research design did not include a control group, the quantitative results therefore can only be considered tentative and suggestive. Without the control group, the researchers cannot rule out that the difference in results were attributed to class maturation.

As indicated by the Mann Whitney U, the results show a significant difference between the pre and post course evaluations suggesting that the two pedagogical approaches, one traditional comprising lecture, PowerPoint slides, and discussion as compared to the other which comprised discussion, PowerPoint slides, and Java Applets had a different impact on student learning, expectations, and on knowledge generation.

The teacher evaluations also resulted in significant differences in 6 out of 9 items. The three that did not show a difference, one would expect that it would remain constant in both types of sessions. That is, one would expect the teacher to be positive in both sessions. One would expect the teacher to provide clear feedback in both sessions. It would also be reasonable to expect the teacher to be as effective as possible with whatever course instruction material he has at his disposal. The other six items that resulted in significant differences comprised selection of activities, variety of approaches, presenting and elaborating clear information. The items that involved positive creative climate and relating to students at a personal level may be attributed to the Java Applet games that fostered a fun atmosphere and permitted the instructor to express his own style through the activities.

The bar charts indicated that students had more favorable responses when evaluating the post session evaluations, namely variety of activities used to learn statistics, feeling more knowledgeable about statistics, and that the post session was worthwhile.

Since a control group was not used and thus posed a limitation, qualitative data were generated and analyzed to bolster the findings of the Mann Whitney U test. The tally of responses indicate that students found the Java Applets (n=34) memorable. This category was the most cited category than any other. It also appeared that students had less

negative reactions to the post session than to the pre session, 6 to 13. The pre session reactions varied.

The pre session narratives were mostly positive when concerning definitions (providing students a definition and a verbal description of definitions concerning statistical terms). These statistical terms were provided via powerpoint slides and lectures. The findings in the pre session narratives also pointed to 23 requests that were made to improve learning as opposed to 10 that were made in the post session narratives. These results suggested that in the pre session, student identified many more learning gaps and therefore made suggestions or requests that would help fill them.

Conclusion

According to the Mann Whitney U tests and bar charts, it appears that the Java Applets had a different impact than the pre session that just included lecture, PowerPoint slides and discussion. Although there were some limitations, namely the sample was small and there was no control group, the qualitative study was conducted to provide a more accurate assessment of the efficacy of Java Applets in course instruction. That is, albeit anecdotally, students in the post session were more actively involved, found the activities fun and when responding to the survey questions, were more elaborate. For example, Java Applets were mentioned most frequently and contained the most coded narratives (n=34). Students also found useful an article walk-through and the use of an organizing framework involving scale evaluation. When the organizing framework was used repeatedly in concert with the article, students were better able to interpret statistics as indicated by the number of positive responses in the post session qualitative study than the post session.

Contributions this project has made (or will make) to the campus community: (please provide a date for, and brief description of, the fall faculty development workshop that you agreed to conduct as part of your fellowship)

- I drafted an article that I would like to submit for publication. Please see attachment. This article can also be made available to the BSC community perhaps through the CASTL website. This article has a description of the kind of activities that helped make my course instruction a success. The reference section has a partial list of internet sites where instructors can search and find applets that can be immediately used in the classroom. The reference section also mentions a book containing many activities and case studies from which other BSC faculty members can draw.
- Since receiving this fellowship, I have introduced the use of applets to my colleagues. The department Chair has asked me to coach him on using the applets, activities, and other visual aids in preparation for future classes. Another colleague in my department has already utilized the applets to enhance her course.
- Five graduate students have already asked me for the links to these applets. They are instructors in other school systems and wanted to enhance their course instruction.

- I do not have a date selected for the fall faculty development workshop. However, I am in a position to deliver upon any dates suggested by Dr. Albers. My faculty development session will include a paper presentation. Please see the same attachment. It will also include a brief description and demonstrations of the following activities that have been applied in my course such as the correlation points Java Applet that permits the instructor to add points interactively to a scatterplot; Java Applet for matching correlations; an interactive presentation involving a United Nations Human Development Report; applets to illustrate an ANOVA; a technique called highlighting, which is used in Creative Problem Solving to reduce a large number of ideas into a more manageable number using the software program VUE, that was used to introduce factor analysis.

Professional benefits you have experienced as a result of your fellowship:

- I have completed a draft of an article that I plan on submitting to the Journal of the Scholarship of teaching and Learning or the Journal of Statistics Education. This article will help bolster my list of publications.
- The graduate students provided me very helpful feedback to understand their learning and understanding of statistics. Additionally, their feedback stimulated other ideas to continuously develop the course.
- My literature review led me to other technologies that I plan on incorporating into the classroom instructions. Ideas to continue development (VUE, the computer based tutorial ConStatS, and the simulation tool Prob Sim.
- I have subscribed to a group network for teaching statistics in classroom
- I have earned stature and respect in the department as a result of the enhancements made to the creativity and measurement course
- More students have asked me to advise them on their thesis because they feel less daunted by research.