

Progress Summary

I am honored to be one of the Chellgren Professors and as far as I can tell, I am on track for my project. Of course the more I work on it, and the better I understand what I'm going to do, the less impressive it seems. But that also holds true for most every theorem I've managed to prove in my research life as well. I have included a summary of my progress in this document.

The proposal promised a comparison between virtual and concrete manipulatives in a conceptual, non-mathematical statistics classroom. The original timeline through the summer of 2009 is repeated below:

Fall 2008

- Utilize colleagues at U.K. and at other (to be specified) universities to identify 3-5 concepts that are agreed upon as essential in a general education environment for understanding the role of statistical science in our everyday lives.
- Utilize colleagues at U.K. and at other (to be specified) universities to begin to design (or purchase) concrete manipulatives to address the concepts mentioned above.
- Identify, archive, and prepare to deploy electronic manipulatives to address the concepts mentioned above.
- Begin the IRB approval process for the study.

Spring and Summer 2009

- Complete construction or purchase of the concrete manipulatives.
- Recruit and train graduate student for study (from within our existing enrollment) in the use of both types of manipulatives.
- Pilot test the concrete and electronic manipulatives on Statistics Department TAs.
- Carefully design the appropriate parts of the STA 200 curriculum so that that either set of manipulatives can be employed, depending on treatment section.
- Finalize the IRB approval for the study.
- Begin to design an assessment (emphasis on simplicity of design) to address the content and the classroom environment.

I have had to adapt this timeline for a variety of reasons, but will still be at the intended place at the end of the summer. In particular, here is what I have accomplished so far:

- I formed an advisory committee within STA last summer and we have met once face to face (early in this term), but have exchanged many emails. The result has been:
 - An endorsement of the simple design I'm using. The infamous exploratory statistician, John Tukey, once noted that "an approximate answer to the right problem is worth a good deal more than an exact answer to an approximate problem." As his academic grandson, I couldn't agree more. I don't like making designs overly complex just so we can produce more exact answers from a model that is less realistic. After a long, productive discussion, the design has internal approval, which I feel is very important since some of the folks on the advisory committee are experts in experimental design.

- Advice on what concepts to surface. I have taken most of this advice but not all. Indeed, the primary reason for me rearranging my timeline was the intense discussion being had within the statistical inferential reasoning (SIR) curriculum team, which I convened, on just this topic. I saw this interaction as a way to directly link my project to the current reform, which was one of the clear stipulations placed on the original RFP. In short, the internal committee wanted me to spend some time focusing on descriptive statistics in my study, but I have chosen to stay with the more subtle inferential topics, since these will be better aligned with the new SIR template.
- Very helpful discussions and feedback on the actual concrete manipulatives I plan to use in my study.
- I have purchased several concrete manipulatives (spinners and stackable pegs) and I have archived appropriate, matched virtual manipulatives. As of right now I'm set on how I will motivate sampling distributions (the Central Limit Theorem), and confidence intervals in each environment. I want to add a pair of manipulatives on experimental design, and one on hypothesis testing. I am currently working on those units and will complete them this summer.
- I have begun the IRB process, with the paperwork submitted for an exemption. Joe Brown is not convinced I'll get an exemption since the notion of having an intervention that is part of the required course work will be confusing to the Board. I sat with him and tried to explain how everything, right down to the recitation instructions and follow-up assessments will be the same for all of my recitations. The only difference is that half of them will work with virtual toys in the recitations, and the other half will work with concrete toys. I dutifully made the case that there was not enough known at present to suggest that either treatment was superior and, hence, neither group could claim an advantage. However, with the recent GAO sting and subsequent shutdown of Coast IRB for capricious granting of exemptions, I'm not sure I'll get one. I'll do what I need to do to get the paperwork completed by fall. David Sacks, from TASC, who is human subjects trained, as am I, has offered on many occasions to help with this process if needed.
- As STA DUS I get to see the personnel needs from a very intimate perspective, since I make all the TA and faculty course assignments. We simply won't have a TA to help me in the fall, so I will not be training one.
- I have recruited a large cache of STA instructors (faculty and graduate students) who have agreed to sit through a couple of trial runs with the manipulatives this summer. My hat is off to them for their generosity.

My summer will be very busy:

- I have to finish working my treatments into my course. That would normally have been much easier than it is going to be. I'm under some pressure from the DUS (OK, that's me) to start to rearrange the course I'm teaching so that it is clearly in line with the new SIR template, and also more interesting to students in general. I have given detailed plans to the Department on how I think we should do that in general, and I plan to implement part of those plans (only part) into my course this fall.

- I have to design assessments with the help of the Office of Assessment (who just lost their Assistant Director) and David Sacks (from TASC).
- I need to finish construction on my last two concrete manipulatives. At least one of these will physically be a construction in my workshop.

Financial Statement

I had originally planned to take no salary from the Chellgren award, but use it all for travel and supplies. Largely thanks to Gen Ed reform, and partially to fiscal year deadlines, I have not been able to find time to travel, so I've earmarked the money for summer salary. In early April I had planned to only take part of it for summer salary and then use the rest for my project supplies. However, my Chair, who, by the way, is consistently excellent at supporting his active faculty, worked to optimize my summer income by offering to pay for any Chellgren supplies I need out of the Departmental budget. I can explain in more detail if necessary. Still, using the money as summer salary this first year is probably appropriate anyway, since, as you can see above, my summer will almost exclusively be devoted to my Chellgren duties. I have one Ph.D. student defending in early June, but other than that, Chellgren will supplant other research agendas this summer. Finally, the manipulatives I have purchased so far all came from money left over from a research fund from the fall that I had, so I have not had to take my Chair up on his offer yet. But I will.