Business Statistics II (Intermediate Statistics): Reflection in a Traditional (Face-2-Face) Statistics Course

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Course Information -- STAT211 -- Business Statistics II

The goal of Business Statistics II is to impart statistical tools appropriate for the creation, analysis, and transformation of data into information that can be used in business decision making. Business Statistics II builds on the previous application of descriptive statistics (both tabular and graphic representations, probability, sampling and confidence intervals. In Business Statistics II students learn appropriate techniques for examining sample data and making statistical inference about the population within the context of business applications. Such techniques include hypothesis testing for means, proportions, and variances; goodness of fit tests; analysis of variance; simple and multiple regressions, model building, time-series forecasting models, quality control, and decision analysis

COURSE OBJECTIVES
1. Use statistical methods in Excel 2010 to create, analyze, and transform data into information used in business decision making.
2. Formulate and test hypotheses about a population mean and/or a population proportion.
3. Develop interval estimates and conduct hypothesis tests about the difference between two population means.
4. Make inferences about the variance of population(s).
5. Conduct goodness of fit tests.
6. Understand the basic principles of an experimental study.
7. Use Excel 2010 to complete statistical data analyses including ANOVA, correlation, regression, and time series.
8. Provide good forecasts or predictions of future values of a time series.
9. Investigate statistical methods for quality control.
10. Examine decision analysis strategies for optimal decision strategies when several decision alternatives are available.

Ignatian Pedagogy and Reflection
The Jesuit education is characterized as a call to human excellence through the fullest possible development of all human qualities; a development of the whole person through critical thinking and disciplined studies.
The notion of presenting academic subjects out of a human "centeredness", "with stress on uncovering and exploring the patterns, relationships, facts, questions, insights, conclusions, problems, solutions, and implications which a particular discipline brings to light about what it means to be a human being" seemed at first to me to be a stretch for a quantitative course such as business statistics. I was quite comfortable with introducing techniques for problem solving and bringing to light albeit briefly, insights and implication based on problem solutions, but unprepared to opportunities that statistics brings to light about what it means to be a human

being.
As I explored Ignatian pedagogy through Mission Academy conversations, the notion of Reflection, seemed most directly appropriate for the discipline. Of the five key teaching elements embodied in Ignation Pedagogy: Context, Experience, Reflection, Action, and Evaluation, Ignation pedagogy goes beyond traditional education experiences by insisting that reflection is added between experience and action whenever appropriate in the learning process. Reflection allows students to draw meaning and value from experience by assimilating facts and testing validity of hypotheses, developing predictions about what will work, and locating a source of feeling and reactions to the "statistically" enhanced decision-making process. In discovering solutions to statistics problems, I erroneously considered that in posing the question "What does this mean in terms of the business decision?" that I was not only asking students to "reflect" on the implications of the decision, but as well to think critically about such implications. In addition to presenting the course reflection assignments from spring 2012, I offer appropriate adjustments to these assignments for future enhancement.

Course Reflection Assignments
Peter Huber, a pioneer in the publication of work in the area of robust statistics, made important contributions to computational statistics, strategies in data analysis, and applications of statistics in fields such as crystallography, EEGs, and human growth curves. In his own reflection, Huber writes, "The interpretation of the results of goodness-of-fit tests must rely on judgment of content rather than on P-values. This perspective becomes more commonplace today but, as Huber writes, "for a traditional mathematical statistician, the implied primacy of judgment over mathematical proof and over statistical significance clearly goes against the grain." The next question is where the judgment comes from. "One answer is that an experienced statistician might work on a few hundred applied problems during his or her career and that will impart some judgment. But what advice can we give to people without such a personal history?"

Discovery of Huber's comment on interpretation of results along with participation in the Mission Academy has led me to further explore mathematically reached conclusions with my students. I offer the following as examples.

An Example from basic Problem Sets
Major League Baseball would love to speed up the play of baseball games to maintain fan interest. Examine a dataset of games played during each of two seasons. What was the percentage reduction in the meantime of baseball games during the most recent season?
Should management be pleased with the results of the statistical analysis? Discuss.
Should the length of baseball games continue to be an issue in future years? Explain.
In this example, students are offered the opportunity to expand their thinking beyond the resulting calculations and further reflect on how this slight mathematical improvement affects the world of baseball. Ensuing class discussion provides opportunities for students not as well-versed in the quantitative methods involved to participate confidently by expressing their opinions for improvement in the process.

Case Problem Examples
Ethical Behavior of Business Students at Bayview University
"...part of the reason for such unethical business behavior may stem from the fact that cheating

has become more prevalent among business students (Chronicle of Higher Education, February 10, 2009)"
Report descriptive statistics and conduct hypotheses tests considering whether the proportion of business students cheating at Bayview is less than that reported at other institutions? Less than that of nonbusiness students? Advise the dean on the nature of cheating at Bayview University based on your analysis.

A Bipartisan Agenda for Change
Should legislative pay be cut for every day the state budget is late?
Should there be more restrictions on lobbyists?
Should there be term limits?
Test for the Independence of response with party affiliation.
Does it appear that there is broad support for change across all political lines? Explain.

Questions for continuous consideration and discussion?
Is there a need for more testing?
Is there a need for larger sample sizes?

Instructor Reflection and Future Enhancements
As I matriculated through the academy I discovered that these discussions of Ignatian Pedagogy were encouraging me to think further outside the instruction of statistical processes box and encourage personal reflection associated with calculated results. Digressing from the rigor of calculation encourages participation otherwise avoided by students struggling with concept and calculations. This strategy not only supports greater participation in class discussion but reinforces Ignatius' notion that lasting learning can only happen when time is spent reflecting on the experience.

My experience in the Academy has re-juvenated my intent to embrace the Jesuit goal of educating the whole person. This can be accomplished by greater infusion of reflection exercises (with more depth) into my curriculum. I intend to re-introduce Case problems into the course and add in addition to text-based material, a required reflection, both on the process and results of decision-making alternatives.

Reference
http://www.ajcunet.edu/
http://www.stat.columbia.edu/~cook/movabletype/archives/statistical-computing/