Innovative and Creative Undergraduate Teaching Proposal

Increasing Knowledge Retention of Business Statistics through Discipline-Specific Case Studies

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Rationale

Many students find the quantitative analysis series in the Goddard School of Business and Economics to be difficult. In addition, knowledge retention of business statistics is low. One of the common student complaints heard by Mara Sikkink, Coordinator of Academic Advising, is that Business Statistics II (QUAN 3610) is extremely difficult and students fail to understand how the course relates to their chosen discipline. The lack of understanding of the value of statistical tools within disciplines can be present for all students, even those who earn a passing grade and enroll in advanced classes. This outcome is unfortunate and we may be failing some of our students by not helping students to identify the applicability of statistical tools to the students’ specific discipline.

If students do not retain and recall core concepts from QUAN 3610, the failure is magnified as the student progresses into advanced course work which applies statistical tools to solve discipline-specific problems. Many students will be at a deficit in preparation for latter course work and instructors may be required to dedicate classroom time to reinforce or reintroduce material from students’ prior course work. This problem impacts all students and exists across all disciplines within the Goddard School of Business and Economics. For example, QUAN 3610 is a cross-functional core requirement with approximately 250 students per semester. Every business major and minor is required to take QUAN 3610. Further, QUAN 3610 is an important building block for upper division courses. The depth of understanding obtained in business statistics carries over to additional course work in Financial Management (FIN 3200), Capital Budgeting (FIN 3500), Strategic Management (BSAD 4780), Mathematical Economics (ECON 4560), Introduction to Econometrics (ECON 4550), Corporate Finance (FIN 4400), Quality Management and Productivity (SCM 4100), and Introduction to Business Research (BSAD 3500).

Extensive research has been undertaken to identify teaching techniques that enhance the learning process. The main focus over the past three decades is to move away from the traditional lecture were students passively listen and move towards participatory classroom activities where students are actively engaged (see Adler (1982) for an early argument promoting active learning). A common active learning approach in business schools is to have students interact in the analysis of case studies (Christensen, 1981). Students who participate in a discipline-specific case study application often have a greater understanding of the material (Flyvbjerg, 2006). Further, the students’ understanding of the material has greater depth when the student cares about the material (Erickson, 1984). Mustoe and Croft (1999) found that for engineering students, case studies increased the students’ interest in the
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subject. Designing case studies that are discipline-specific and utilize statistical tools to evaluate and inform business decisions may be an effective approach for improving the business students’ understanding and retention of business statistics.

Description of the Innovation

Herein we propose to improve students’ knowledge retention of business statistics by designing case studies that are specific to each discipline in the Goddard School of Business and Economics and cover each core area of the course. It is our hypothesis that students will be more engaged and will demonstrate greater retention of course material when applying statistical tools in a chosen discipline-specific business environment. Further, if properly designed, the case study could be useful to reinforce foundational material for students’ future course work.

To achieve this objective, numerous case studies for each specific statistical tool will be developed for each business discipline. Ideally, case studies will cover hypotheses tests regarding means, variances, analysis of variance, and regression analysis for accounting, business administration, economics, finance, marketing, and supply chain management. The deliverable product resulting from this grant will be a library of short discipline-specific case studies. The case studies will provide a strong, explicit link between statistical tools and future course work.

The case studies will be developed by a Weber State University faculty member in each discipline in the School of Business and Economics. Currently, faculty members of the Department of Economics teach business statistics. Faculty from the Department of Economics may have a penchant for economic examples. While relevant and interesting to the faculty and applicable to statistics in general, they may not apply to students’ majors. Furthermore, faculty in economics may not have access to data sets relevant to other disciplines. Therefore, to improve discipline relevance and knowledge retention of students, faculty in each department will develop case studies for the students in QUAN 3610.

Learning Objectives

The case studies are designed to enhance understanding in several Goddard School learning outcomes. First, the discipline-specific case studies will increase “knowledge of key concepts in the major business disciplines” (GSBE Learning Outcome 3). Specifically, by using case studies from every discipline, students will have a broader understanding of their academic area, through the lens of statistics. Second, the case studies will require that students “apply the appropriate tools to display, analyze, and interpret business data” (GSBE Learning Objective 4a). Third, completion of the case studies will require students to “prepare professional-quality business documents” (Learning Objective 1a) and to effectively communicate their solutions to case problems. Finally, students are required to use Minitab or Excel to complete case studies, thereby providing additional support to Learning Objective 4a: Be proficient with business software. Incorporating specific and relevant case studies to the rigorous underlying framework of business statistics will greatly facilitate knowledge retention.
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Sustainability

As described below, we will use appropriate methods to evaluate the effectiveness of the discipline-specific case study approach relative to the traditional approach. Upon the completion of our analysis, the results will be presented to the Department of Economics and Dean Steagall with the goal of obtaining full participation of faculty teaching QUAN 3610. With Dean Steagall’s approval, the library of case studies will be made perpetually available to all instructors of business statistics.

Implementation and Experimental Design

Once the cases are completed, Business Statistics II will be designed to offer a case study from each discipline with the student making the case study selection. Two or three case studies will be required as homework for each chapter in the course. Case studies will also be used to stimulate interactive discussions during lectures. Because the department faculty from each department will have created the case students, they will be pertinent to the students’ discipline and course work. Students who have yet to decide on a discipline or who have not chosen a field within their discipline will have broader exposure to business disciplines and approaches to business assessment and decision making. This collaborative approach will improve the learning environment through active and experiential learning.

This study incorporates two hypotheses: H1) students have a greater understanding of the application of statistics within their discipline; and H2) students are better prepared for upper division courses that build on QUAN 3610.

To test H1, we propose a before and after survey that asks students questions designed to assess discipline specific understanding of the QUAN 3610 statistics tools. The survey instrument has yet to be written. To establish a base, we will teach one section with traditional case studies from the text. We will then compare the base to the discipline-specific, case study course.

To test H2, faculty members in advanced upper division courses will incorporate a pretest at the beginning of the semester to evaluate the retention of statistical concepts specific to the course. Pretest analysis will be conducted to ascertain the impact of the two treatments on student knowledge retention.

To control for ordering effects we will implement the study in both semesters of the 2014-2015 academic year, reversing the daily order of the section offerings (traditional case studies; Discipline specific case studies). In addition, we will implement the study across two lecturers, Drs. Koford and Parkhurst.

The analysis of H2 will be conducted in the spring semester of the 2014-2015 academic year and the fall and spring semesters of the 2015-2016 academic year. To isolate the effects of the case study strategy, only individuals from the four sections evaluated for H1 will be included in the H2 sample. Our formal analysis will form part of a manuscript that will be submitted to a top general interest business education journal.
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Budget

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<tr>
<th>Budget - Innovative and Creative Undergraduate Teaching Proposal</th>
<th>Per Faculty Stipend</th>
<th>Per Faculty Benefits</th>
<th>Number of Faculty</th>
<th>Total</th>
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<td>Case Writers</td>
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<td><strong>Total</strong></td>
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The budget for this project totals $13,824. Creation of the cases and assessment tools will be completed during the summer, 2014.

$1,200 (plus the required 44 percent benefits for a total of $1,728 per faculty member) will be paid to each of 6 faculty members to create 6 to 8 discipline specific-case studies with solutions. Case studies will be created for accounting, business administration, economics, finance, marketing, and supply chain management. This funding represents a one-time expenditure for a permanent improvement to a course required for all business students.

The remaining $2,400 ($3,456 including benefits) will be paid to faculty members (co investigators) to create the pre and post surveys assessment tools. Assessment tools will measure the subjective attitude of business students and the actual discipline specific understanding of the statistical applications. The assessment will occur following completion of QUAN 3610, and at the beginning of advanced courses that have a significant statistical component and QUAN 3610 as a prerequisite (i.e. FIN 3200, FIN 4400, SCM 4100).

References:


