

Using Inter-Class Teams in Teaching Business Statistics

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Abstract

Much has been written about teams in both the corporate world and in academia. This paper introduces a new format for student teams. To simulate the real business world, in which employees are teamed with co-workers from various departments, students were randomly assigned to “inter-class” teams. Each team consisted of two students from each of two professors’ introductory business statistics classes. Students were required to select real data sets, submit a proposal, analyze the data, and present their findings. Inter-class teams can be adapted easily by faculty teaching in any discipline that includes learning experiences in group dynamics.

Introduction

In the early to mid-1980s W. Edwards Deming became known and respected by corporations worldwide for his principles of quality management. Deming, a statistician and management consultant, played a major role in the revitalization of the Japanese economy following World War II. He set forth his principles for business effectiveness in his 14 Points for Management (Deming, 1986). Deming’s ninth point is to “break down barriers between staff areas” (Deming, 1986: 62). According to Deming, management must break down barriers between departments and staff by encouraging teamwork across the various areas of an organization (e.g., research, design, sales, administration, and production). He states, “Teamwork is sorely needed throughout the company. Teamwork requires one to compensate with his strength someone else’s weakness, for everyone to sharpen each other’s wits with questions” (Deming, 1986: 64).

From Deming to the present time much has been written on the importance of teamwork. Training students to become effective team leaders and team members (Cox & Bobrowski, 2000; Thacker & Yost, 2002), suggestions for improving student team projects (Hansen, 2006), suggestions and effectiveness of organizational teams (Piña, Martinez & Martinez, 2008; Yeh, E. et.al., 2006), and essential characteristics for successful teams (Ruiz Ulloa & Adams, 2004) are just a few examples of such writings. In addition, globalization and advances in technology have led to the development and study of virtual teams (Hunsaker & Hunsaker, 2008; Malhotra, Majchrzak, & Rosen, 2007).

It is well-documented that employers desire leadership and team skills when hiring new employees. According to Ashraf (2004: 214), “it is an established fact that employers

seek a team player when making hiring decisions.” Employers “also need employees who know how to work effectively with others” (Hernandez, 2002: 74). The “team culture of business today places additional emphasis on the ability to work effectively within a team environment.... Employers consistently mention collaboration and teamwork as being a critical skill, essential in almost all working environments” (Tarricone & Luca, 2002: 54). Businesses that “continue to perform successfully rely on teamwork as an essential basis for everyday operations” (Tarricone & Luca, 2002: 55).

If the ability to be a team player is one of the major skills of a prospective employee (Ashraf, 2004), then “...some responsibility must rest on the academic institutions to prepare the students to become effective team members and leaders” (Thacker & Yost, 2002: 93). As evidenced in the following quote, the Association to Advance Collegiate Schools of Business (2008) recognizes the importance of learning experiences in group dynamics stating the importance of active, collaborative learning:

Regardless of the delivery mode of the program, students should have opportunities to work together on some learning tasks. Each student is a resource who brings unique experience and knowledge to combined tasks. Students need to acknowledge their responsibilities to their fellow students by actively participating in group learning experiences (AACSB, 2008).

To provide a collaborative active-learning experience that more closely resembles the type of teams business students will later join as active employees, we introduced a new format or structure to a traditional classroom team. Each of us taught a single section of a first course in a two-course business statistics sequence required of all business majors. We randomly assigned students to what we called “inter-class” teams of four students. Each team consisted of two members from each of our class sections. There were a total of 13 inter-class teams. Although both professors used the same textbook and followed a similar syllabus, one professor emphasized computer applications using SPSS and the other professor emphasized the use of Excel (recognizing that Excel is not a statistical package). Our experiment was to simulate Deming’s principle of breaking down barriers between departments and staff in different areas of an industry to breaking down the barriers between students studying the same subject under different professors.

The Team Project

The context for this teaming exercise was a project designed to require students to demonstrate basic statistical literacy. We used guidelines from the American Statistical Association (ASA) for our definition of statistical literacy. In 2003, the ASA funded the Guidelines for Assessment and Instruction in Statistics Education (GAISE) Project which lays out guidelines for developing statistical literacy. The GAISE project developed “ASA-endorsed guidelines for assessment and instruction in statistics in the K-12 curriculum and for the introductory college statistics course” (American Statistical Association, 2005:1). The GAISE Report of 2005 includes goals for students to be

considered statistically literate and the following six recommendations for the teaching of introductory statistics:

- 1) emphasize statistical literacy and develop statistical thinking;
- 2) use real data;
- 3) stress conceptual understanding rather than mere knowledge of procedures;
- 4) foster active learning in the classroom;
- 5) use technology for developing conceptual understanding and analyzing data; and
- 6) use assessments to improve and evaluate student learning (American Statistical Association, 2005).

The inter-class team project follows the GAISE recommendations. Specifically, the project:

- 1) fostered active-learning between students (GAISE Recommendation #4);
- 2) required analysis of real data (GAISE Recommendation #2); and
- 3) utilized computer output from SPSS and/or Excel (GAISE Recommendation #5).

The GAISE Report also suggests that educators give “students plenty of practice with choosing appropriate questions and techniques, rather than telling them which technique to use and merely having them implement it” (American Statistical Association, 2005: 8). We followed this suggestion by requiring each team to formulate its own basic research questions. Merely computing a few descriptive measures in SPSS or Excel was not sufficient. Further, the GAISE Report recommends that students be given practice with “open-ended problems and projects.” The basic goals and specific requirements of the inter-class team project are listed below.

Basic Goals of Inter-Class Team Project

- 1) work as a team to develop a presentation using basic statistics to examine a business issue;
- 2) demonstrate understanding of basic statistical concepts presented in the introductory business statistics course (GAISE recommendation #1);
- 3) demonstrate basic competence in using the SPSS and Excel software for statistical analysis (GAISE recommendation #5);
- 4) demonstrate the ability to formulate basic research questions that can be examined with the statistical tools presented in an introductory business statistics course. In other words, it requires more than simply doing a few things in SPSS and Excel – it requires you to conduct logical analyses (e.g., Does it make sense to look at the relationship between these variables? Why would a particular graphing technique describe a certain set of data?) (GAISE recommendation #1 and GAISE recommendation #5); and
- 5) demonstrate the ability to work with a team to present a coherent and thoughtful description of your analyses.

Specific Requirements of Inter-Class Team Project

- 1) choose datasets for your analyses (such as those provided with SPSS or your textbook);
- 2) produce output for each of the following statistics/graphs:
 - a. frequency distribution;
 - b. cross-tabulation;
 - c. measures of central tendency and measures of variation;
 - d. graphing techniques for all basic types of variables (discrete, continuous, interval, ordinal, nominal); and
 - e. bivariate regression and correlation;
- 3) describe the variables you selected to analyze and provide a brief justification for why you selected them (i.e., why is this variable important, or why do you think there may or may not be a relationship among the variables);
- 4) demonstrate your SPSS abilities to select specific cases to analyze with the SELECT IF function;
- 5) demonstrate your SPSS abilities to transform at least one variable through recoding – i.e., recode at least one variable;
- 6) be thorough and thoughtful – i.e., don't simply present a pie chart and sit down.

Lessons Learned

Before groups began working together, we gave them a simple survey asking what they thought about the inter-class team concept. More than 80% of the students indicated anxiety about the inter-class team approach – a particular concern was that the project might negatively affect their grade. At the start of the project, nearly one-third of the students thought that the project was simply a “bad” idea. One student wrote,

“Maybe allow students to choose who they work with in either their class or the other class so that they have some say in the groups and in the outcome of the team's success/failure. Getting paired with 2-3 people without any choice is a little tough because we've had enough classes to know who we can trust to be good group members and who acts as social loafers and I think it would make it more fair.”

We believe this quote was typical of most students' perspectives on the inter-class team concept at the beginning of the project. We also believe that this quote is a perfect illustration of the need for educators to intentionally provide opportunities for students to work in groups not always of their choosing. Deming's idea of the need to break down barriers is illustrated in this sentiment.

At the completion of the project, students were also asked for their opinions of the inter-class team concept. Most students expressed satisfaction with the collaborative learning resulting from working with students from a different class. In the end, nearly all of the

students provided positive feedback about this experience. One student wrote, “I absolutely loved the project....[it] allowed me to be creative....” We learned several lessons from our experiment using inter-class teams in the teaching of business statistics. First, we learned that teams of students could demonstrate basic competence in using the SPSS and Excel software for statistical analyses and they could demonstrate an understanding of basic statistical concepts presented in the introductory business statistics course. We were also pleased with the teams’ abilities to formulate research questions and believe that many of the principles presented in the GAISE report (American Statistical Association, 2005) were demonstrated in the student projects. Specifically, we are confident that students participated in active learning, used real data, and used technology to develop their conceptual understanding of business statistics. While the quality of team presentations varied from average to excellent, overall, we were very pleased with the learning outcomes we observed in the students’ group presentations.

Perhaps not surprisingly, we also learned there are additional logistical issues involved when using inter-class teams. Because the two classes met at different times, there were logistical problems in finding common times for teams to meet and for the final team presentations. A common student complaint was that team members could not find common times to meet as a group. A solution to this logistical problem is to give the groups more time to work together throughout the semester. In this first experiment with inter-class teams, we introduced the project and established the inter-class teams at midterm of a standard 15-week semester. In future projects, we would establish the inter-class teams in the first two weeks of the semester and require that the groups keep logs of their meetings. In these logs, we would require that the teams document how many times they met, group member attendance at the meetings, and the basic accomplishments of the team meetings.

In *The Lady Tasting Tea* (2001) David Salsburg states, “Deming proposed that the production line be seen as a stream of activities that start with raw material and end with finished product....Instead of waiting for the final product to exceed arbitrary limits of variability, the managers should be looking at the variability of each of these activities” (Salsburg, 2001: 252). The next time we use inter-class teams we, the managers (professors), will adopt these suggestions and will look more carefully for variability at each stage of the production process (course proposal to research questions to computer output and interpretation) to the final product (paper and presentation). We will use team logs to follow the progress of the groups.

Another lesson we learned is that students committed significant time and effort to the group projects and the assignment should contribute significantly to the students’ semester grade. In this first experiment with inter-class teams, the group project only contributed 10% to the total grade. In future semesters, we would make the inter-class team project a larger portion of the total grade.

At the end of the project and after the teams made their presentations to the both classes, we asked team members to evaluate each other. Specifically, we asked our students to

confidentially evaluate each group member on four aspects of team membership: the level of cooperation, group meeting attendance, overall contribution to the group project, and whether the evaluator would like to work with the group member on a future project. We felt this was important because it provided students a cathartic vent for student frustrations with non-contributing group members. This also gave us additional insight to the group dynamics we observed through the course of the project and the final presentations and it contributed to our evaluation of individual group member contributions to the projects.

While teaming as a teaching tool has received attention in the research literature (Hansen, 2006), more research is required on using inter-class teams as a pedagogical tool. Our first experiment with the inter-class team approach was successful in two sections introductory business statistics. Further, we believe inter-class teams can be adapted to other courses that require collaborative learning. Future research on inter-class teams should investigate areas such as: inter-class team group dynamics, suggestions for improved effectiveness of inter-class teams, and techniques for faculty collaboration.

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Biographies



Betty Thorne is professor of decision sciences and director of undergraduate studies for the School of Business Administration at Stetson University in DeLand, FL. She received her Ph.D. from Indiana University. Recipient of numerous teaching awards, she teaches at the undergraduate and graduate levels including the Executive MBA program, Stetson's JD/MBA program, Stetson's Executive Passport program, and Stetson's Summer Abroad program in Innsbruck, Austria. She has co-authored several statistics textbook including *Statistics for Business and Economics, Seventh Edition*, Prentice-Hall (2010).



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