Using Self-Reported Data Collection and Analysis to Facilitate Student Learning: A Case Study[1]

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Abstract

This activity was used to help teach microeconomic concepts and empirical analysis. As part of an undergraduate course in agricultural economics, students recorded their own fruit and vegetable consumption over a 7-week period. Students also used the aggregated class data to perform econometric analysis and test their own hypothesis regarding fruit and vegetable consumption. Based on student survey responses, this approach appeared to help students with key learning objectives, although they did not necessarily like collecting the data.

Introduction

Motivation for developing DCA approach

There are numerous opportunities facing undergraduate students of agricultural economics. First, they have to have at least some cursory interest in learning economics, both theory and applications. As many are drawn to agricultural economics programs for their practical focus on agricultural, food, natural resources or the environment, interest in theory can be a difficult barrier for some. Assuming that the student can deal with some amount of theory, their next potential challenge is to learn how to apply the theory to the practical foci of agricultural economics. That is, they have to conceptually understand how markets work and practically how economics are used to evaluate actual markets.

For the instructor of agricultural economics, this creates numerous difficulties and opportunities, which at a minimum, keep the profession interesting. To make this process more challenging, students don't always come from backgrounds that equip them to understand agricultural markets. That is, even though they know about agricultural products, they are not always knowledgeable about agricultural and food supply chains. Even those with food industry experience often have distaste for food industry careers since their prior experience has been in low-level jobs such as fast-food cooks or servers (Litzenberg 2010). As such, students may not even be knowledgeable about food-related industries.

Finally, students are balancing other aspects of their life, perhaps to a greater degree than previous generations. As such students are pulled in many directions outside of the classroom. Consequently, it is important to find innovative and interesting ways to engage students of agricultural economics in the classroom.

In the spring of 2013, the author was assigned to teach an undergraduate course in agricultural and resource economics at a land-grant research university. While the primary focus of the class was teaching intermediate microeconomics, the author was also charged with exposing the students to some empirical analysis. The departmental motivation was to prepare the students for more applied work in higher level courses and to increase undergraduate interest in agricultural economics. As both intermediate microeconomics and empirical analysis generally command and deserve their own courses, this presented a special challenge. To try and engage the students and prepare them to be budding agricultural economists, the author implemented an experiential learning activity for the class. The activity is referred to as the DCA approach (data collection and analysis) for convenience.

Methods

The DCA approach

In the first week of class, students completed a demographic survey via an Excel spreadsheet on the University Blackboard system (Blackboard, Inc). There were 52 questions including age, GPA, and the location of their residence that all students completed (Table 1). In addition, questions were asked regarding their food shopping and cooking habits and their nutritional

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Table 1. Demographic survey questions

No.	Question
1-4	Name; Student ID; Age; Gender
5-7	Hometown; Home state; Permanent address zip code
8	Academic year in school (1 = frosh, 2 = soph, 3 = jr, 4 = sr, 5 = grad, 6 = other)
9	What is your approximate GPA? (0-2.0; 2.0-2.5; 2.5-3.0; 3.0-3.5; 3.5-4.0)
10	Approximately how many people in this class have you interacted with socially outside of class before? (0-5; 6-10; 11-15; 16-20; 20+)
11	Are you required to live on campus? (1= Yes, 0=No)
12	Do you live on campus? (1= Yes, 0=No)
13	If so, what is the name of the residence hall you live in?
14	How many times do you go home in a semester?
15	Do you have a refrigerator for your own use? (1= Yes, 0=No)
16	Do you share a refrigerator with others? (1= Yes, 0=No)
17	Do you own a functioning television? (1= Yes, 0= No)
18	Do you have a functioning car with you? (1= Yes, 0= No)
19	Do you have access to someone else's vehicle on campus? (1= Yes, 0= No)
20	Which statement best describes how often you ride the bus on campus? (…regularly on weekends and weekdays; …regularly during the week (M-F); …regularly on the weekends; …infrequently; …never)
21	Are you a part of fraternity or sorority? (1= Yes, 0= No)
22	Are you a part of the ROTC or a similar organization? (1= Yes, 0= No)
23	Are you a part of an organized school sports team including club teams? (1= Yes, 0= No)
24	How many hours per week do you work at a job on campus? (0; 1-10; 11-20; 20+)
25	How many hours per week do you work at a job off campus? (0; 1-10; 11-20; 20+)
26	If you work off campus, where is your job located (Enter the zip code)
27	Do you have a school meal plan? (No meal plan; Plan A; Plan B; Plan C; Plan D; Not sure which meal plan I have)
28	How often do you use a credit card to pay for food per week? (1-2 times; 3-5 times; 5+ times; I have a credit card, but I don't use it to pay for food; I don't have a credit card)
29	What is the largest area that you would consider local food to be from? (The town you live in; The county you live in; The state you live in; The multi-state region you live in; The United States; Larger than the United States)
30	Aside from the University campus, how many places CAN YOU buy groceries from while a student here?
31	Aside from the University campus, how many places DO YOU buy groceries from while a student here? (Groceries are defined to be food products that you purchase to consume at home, rather than on premise)
32	What types of places do you buy groceries from? (Grocery stores (example); Superstores (example); Warehouse club (example); Convenience store (example); COOP; Farmers' Market; Community Supported Agriculture (CSA); Other (Please describe))
33	Are you a vegetarian?
34	Are you a vegan?
35	Do you have any food allergies or food restrictions?
36	As of today, do you have any plans to take a vacation during spring break this semester?
37	When choosing to attend the University, how important was the University's meal plan? (0-not very; 1-a little; 2-a lot; 3- extremely important)
38	When choosing to attend the University, how important was the non-University food options? (1-not very; 2-a little; 3-a lot; 4- extremely important)
39	How important is overall nutrition to you? (1-not very; 2-a little; 3-a lot ; 4- extremely important)
40	How important is nutrition to you when you shop for groceries? (0- I don't do this activity; 1-not very; 2-a little; 3-a lot; 4- extremely important)
41	How important is nutrition to you when you prepare your own food? (0- I don't do this activity; 1-not very; 2-a little; 3-a lot; 4- extremely important)
42	How important is nutrition to you when you purchase prepared food? (0- I don't do this activity; 1-not very; 2-a little; 3-a lot; 4- extremely important)
43	How important is taste to you when you shop for groceries? (0- I don't do this activity; 1-not very; 2-a little; 3-a lot; 4- extremely important)
44	How important is taste to you when you prepare your own food? (0- I don't do this activity; 1-not very; 2-a little; 3-a lot; 4- extremely important)
45	How important is taste to you when you purchase prepared food? (0- I don't do this activity; 1-not very; 2-a little; 3-a lot; 4- extremely important)
46	How important is it to you to choose a diet with plenty of fruits and vegetables? (1-not very; 2-a little; 3-a lot; 4- extremely important)
47	How important is it to you to consume organic fruits and vegetables? (1-not very; 2-a little; 3-a lot; 4- extremely important)
48	How important is it to you to consume other organic foods (not including fruits and vegetables)? (1-not very; 2-a little; 3-a lot; 4- extremely important)
49	Rank how familiar you are with each of the following programs (1-not very; 2-a little ; 3-a lot ; 4- extremely important): Fruit and Veggies More Matters The Dietary Guidelines for Americans The MyPlate program A Healthier You
50	Rank how familiar you are with each of the following websites (1-not very ; 2-a little ; 3-a lot ; 4- extremely important): Sparkpeople.com Livestrong.com Oobafit.com Fitday.com University Dining Services Mobile App
51	Do you use any mobile applications to help manage your diet? (1= Yes, 0= No)
52	Do you use any online applications to help manage your diet? (1= Yes, 0= No)
53	If you live off campus, what town do you live in?
54	What is your off-campus residence zip code?
55	Do you live with family off-campus? (1= Yes, 0= No)
56	Do you live with non-family members off-campus? (1= Yes, 0= No)
57	Including yourself, how many people do you live with off-campus? (If none, put 0)
58	How many of the people that you live with off-campus are college students? (If none, put 0)

preferences (i.e. questions 39 – 48, Table 1). Students that lived off campus were asked to complete six additional questions (questions 53 – 58). The students were asked to complete the survey by the second week of the semester. Several reminders were sent to the class and over 93 percent of the class completed the survey on-time. The others completed the survey before the midterm break (n = 53).

At the beginning of the second week, students were asked to record their fruit and vegetable (FV) consumption from Monday through Wednesday using an electronic diary and submit this information via Blackboard by Thursday night. In addition, students were asked to describe where they obtained their groceries, how often they ate out, how often they exercised and whether they were ill that week (Table 2). Prior to completing the survey, students were instructed on how to measure a serving size using a standard measure provided by Produce for Better Health Foundation (taken from http://www.fruitsandveggiesmorematters.org/archives/16223). The exact serving measures are described in Table 3. This information was also provided on each survey for reference. Again, reminders were sent to the students and completion rates were over 90 percent each week.

The weekly food diaries were completed for seven weeks and finished before spring break. During the fourth week, the instructor introduced an experimental treatment. Specifically, half of the class was randomly selected and provided an informational pamphlet via email regarding ways to increase their FV consumption. No other instructions or comments were included.

Students that completed all of their surveys on-time (or within a two-day period) received points towards their project for data collection and were allowed to drop their lowest test grade during the semester. At the end of the 7 weeks, personal identifiers were removed and the demographic data and weekly diaries were combined to create a panel data set.

In the first section of the course, the instructor discussed consumer demand during lectures. To facilitate this topic, the instructor solicited student input regarding factors that affect their own FV demand, both quantity and quality. Students were able to easily discuss price and income effects as well as tastes and preferences. In addition, they discussed less traditional topics such as food access and food marketing. Through discussion, the class also discussed behavioral factors that might impact FV consumption. For example, commitment to a spring break trip may help to ensure students have a better diet and exercise more to stay in shape. Being part of a social group or club team may create peer pressure to stay in better shape. The class also discussed various policy issues related to FV consumption.

For the final section of the course, students were required to: 1. Develop a theoretical hypothesis based on demand theory regarding specific factors that might affect class FV demand; 2. Test their hypothesis using basic regression framework; and 3. Write up their analysis in a short report. During this section, the instructor discussed empirical methods and often referred back to the initial discussion in the first section. In addition, the instructor used the class data set to provide examples of analytical methods in class.

Evaluation of the DCA approach

Within the context of agricultural economics, there is a long history of developing experiential learning techniques. Wilson and Nelson (2009) cite an extensive list of examples. While Wilson and Nelson are proponents of what they call active learning, the authors argue that a weakness of active learning in a theory based curricula, such as economics, is the lack of theoretical orientation. By heavily or solely focusing on the activity implemented for the learning process, there is clearly a concern that students may miss the more important conceptual aspect of the learning process. That is, they can miss the intellectual forest for the trees. To that point, it is useful to consider why the DCA approach might be a relevant exercise for an agricultural economics class.

Table 2. Weekly Food Diary Questions

	Questions
1	Over the past 7 days, approximately how many bags of groceries did someone else provide to you? (Check one box only). 0 bags <1 bag 1-2 bags 2+ bags
2	From Monday to Wednesday, how many times did you eat at each of the dining facilities on campus? Location A Location B etc.
3	From Monday to Wednesday, how many times did you eat at a restaurant off campus?
4	From Monday to Wednesday, how many times did you buy grocery items on campus?
5	From Monday to Wednesday, how many times did you buy grocery items off campus?
6	From Monday to Wednesday, how many hours did you spend doing any kind of exercise? This includes cardio vascular exercise, lifting weights, playing sports, etc.
7	From Monday to Wednesday, how many days did you feel physically ill such as from a cold or fever?
8	From Monday to Wednesday, how many servings of fresh fruit did you eat (see definition of a swerving below)?
9	From Monday to Wednesday, how many servings of dried fruit did you eat (see definition of a serving below)?
10	From Monday to Wednesday, how many servings of fruit or vegetable juice did you drink (see definition of a serving below)?
11	From Monday to Wednesday, how many servings of vegetables did you eat (see definition of a serving below)?

Table 3. Fruit and vegetable measurement instructions

Consider 1 cup as the size of a baseball

We define one serving of fresh fruit/vegetables as:
One medium piece of fruit (1 medium apple or orange)
1/2 cup cut-up raw or cooked fruit/vegetable
1/2 cup cooked dry peas, beans, lentils
1 cup leafy greens
1/4 cup dried fruit or vegetables

We define one serving of dried fruit/vegetables as:
1/4 cup cut-up dried fruit/vegetable

We define one serving of fruit/vegetable juice as:
4 oz (1/2 cup) of 100% juice

For more information, go to:
http://www.fruitsandveggiesmorematters.org/archives/16223

Experiential learning is generally described as a process where a person engages in some activity, reflects on the activity in a critical manner and attempts to derive insights from the reflective analysis (Pfeiffer and Jones, 1981). Such learning by doing process in a classroom setting relies on the students: 1. actively engaging the activity presented to them; 2. learning from the engagement; and 3. applying it later. Each of these is discussed in turn.

Activity and Learning

The DCA approach was intended to serve several purposes. First, it was intended to encourage the students to be more observant of the market environment where they acquired and purchased food. Prior to earning their own self-sustaining wage, students may pay less attention to certain aspects of food marketing, such as price, variety or quality since they are often on meal plans or have food provided to them by family. Interestingly, college students often live in a dense food marketing environment where they are given a multitude of choices in confined areas. Further, they are presented with a large number of informational and promotional marketing materials. As such, there was ample opportunity to learn through observation.

The second purpose of the DCA approach was to encourage the students to conceptualize the market forces that may impact their decision making process. The instructor directed some of this thought process as well through discussion and lecture throughout the semester. The intention was that by collecting their own data on their consumption behavior, students also would begin to consider why they consumed what they did.

Another objective of the data collection process was to help students better understand data in general. While students have access to publicly available secondary data sets, (e.g. Census data or Labor data) it may not be clear to them what process is generating the data. That is, even after gathering secondary data, students don't always know what is being measured. Such confusion is not likely because secondary data sources are so abstract. Rather, undergraduate students often don't take the time to consider these data outside the formal structure of the classroom. By collecting their own data, students' basic understanding of the data should increase as well as their time and ability to focus on analysis of the data. As noted by Spencer and van Eynde (1986, p. 291), "*Teaching through experiential learning obviously is easiest in subject areas where students have at least some degree of familiarity with the subject.*" Because they were part of the data collection procedure, students might grasp more of the learning concept.

Finally, the experimental treatment implemented during the semester was intended to help students understand how external factors might affect the data they were collecting. In particular, as some students were given additional information about nutrition, this might change their consumption behaviors. Ideally, this would help to understand data better in general.

Application

After the students spent almost two months collecting and, potentially, thinking about the data, they had to apply what they had learned by testing their own hypotheses. Clearly this can be done with other secondary data sets as well. After collecting their own data, however, the students might be more inquisitive and creative regarding the formulation of hypotheses. If the students spent any time considering the data they were collecting, they may be better equipped to ask relevant and interesting questions. Further, by testing their own hypotheses with their own data, the students would reflect about their own learning and knowledge. As intended with experiential learning, the students might ultimately carry this experience with them beyond the classroom.

Kolb's Theory of Experiential Learning

Kolb's theory of experiential learning, summarized by Spencer and van Eynde (1986) also provides a relevant framework for evaluating the DCA approach as well. According to Kolb, experiential learning is a four-step process. In the first step, learners are involved in a structured activity designed to generate data related to the class learning objective. At this point, the learner reserves judgment and focuses on the task at hand. Clearly, the DCA approach meets the first requirement. Whether or not students "reserved judgment" is questionable. In particular, as students collected data, they may begin to consider the factors that influence the data collection procedure. As previously mentioned, the instructor encouraged this to some extent during lecture.

In Kolb's second step learners reflect on what happened during the experience stage and attempt to explain outcomes of their participation. This took place after data collection in several ways. First, the instructor used the data to motivate analytical methods during subsequent lectures. Second, the class project required them to consider what they could examine or explain with the data they generated.

As a result of the reflections, in the third step the learners make generalizations about what they learned. In particular, this involves developing more abstract thought and incorporating theory. To this end, the formal hypothesis the students created required they not only make generalizations and incorporate some economic theory, but also think more abstractly about the data.

In the final step, the principles and findings are to be used beyond the immediate learning experience. This often involves testing implications of the concepts that were learned in new situations or applying the principles. The analytical methods employed in class (mean comparisons, creating charts and graphs, least squares regression) tested the students' theories directly. Further, the students had to extrapolate from their results to demonstrate their understanding of their findings and provide a write-up of their thought process.

Based on the criteria put forth by Kolb, the DCA approach has the structure and favorable attributes of experiential learning and the potential to help improve

and enhance the student learning process. Still, there are tradeoffs to every classroom activity that each instructor must evaluate.

Costs and Benefits

A natural way for agricultural economists to evaluate the merit of some decision is to consider the costs and benefits. While the costs and benefits of the DCA approach were not explicitly measured, they can be considered qualitatively.

As an instructor, there is the very real opportunity cost of time required to develop and administer any new activity. Due to software and technology, the DCA approach is manageable and has near zero marginal cost. The start-up costs can be significant, however, depending on the nature of the data being collected. Prior to providing the survey instrument to the class, the instructor had the questions vetted by several grad students, a post doc and a fellow assistant professor. This greatly improved the quality of the survey, but also stole others' time. There is also a significant procedural learning curve that has to be overcome. Fortunately, subsequent versions of this activity benefit from any initial investments. Still, for an assistant professor these investments must be balanced with looming tenure requirements.

There are also other intangible costs to be considered as well. As pointed out by Wilson and Nelson (2009), there is the potential loss of reputation associated with experiments that don't work as planned. In the case of the DCA approach, there were minor difficulties that could have easily translated into lower class learning outcomes or class satisfaction. Overall, little difficulties can add up and make a course seem unorganized or unstructured. This can ultimately impact class ratings and enrollment. Unfortunately, the instructor did not have a comparable control group to compare with.

The costs to the students are another important consideration that any instructor should consider. For one, certain students may have a difficult time with an experiential learning activity. Several authors find experiential learning can lead to reduced achievement among students with certain personalities or learning styles (Dickie, 2006; Emerson and Taylor, 2004; Hawtrey, 2007). In addition, the DCA approach requires external effort, which certain students are hesitant to provide. This also requires persistent follow up by the instructor or teaching assistant. While students can be compensated with completion grades, they may resent the deviation from the traditional lecture-exam framework. Students often develop pre-conceived notions about what a college classroom environment should be like. Deviation from such expectations could lead to anxiety or discomfort for certain students. Effort may be needed to help students transition to new learning activities.

At the same time, Hawtrey (2007) suggests that students are not satisfied with a pure lecture classroom environment in economics. Clearly, certain student types will flourish in experiential learning environments and become more excited about such classroom environments. As such, there may be a positive payoff for students who are willing to invest in this learning activity. Further, by diversifying the type of assessments used for grading by incorporating something like the DCA approach, students have more opportunities for success. This can benefit students who do not perform well on tests.

Importantly, there are many benefits for the instructor as well. As noted by Hawtrey (2007), an important benefit of experiential learning is that it explicitly shifts responsibility for learning from the instructor to the student. In turn, this should encourage better, lifelong learning. Implementing experiential learning activities can also make teaching more enjoyable and provide inspiration and a sense of focus for instructors. If effectively executed, they can lead to better student evaluations and a higher classroom reputation as well. As the DCA approach was designed to mirror the instructor's research agenda, this provided greater opportunity to discuss familiar topics in class. Beyond the classroom, this informed the instructor's research opportunities as well. In fact, the aggregate student data provides a small sample data set to investigate research questions outside of the classroom. This extension of the DCA approach does require institutional review, however, which is an additional time investment.

Student evaluation of process

The instructor was not able to identify a comparison group to evaluate whether the DCA approach improved student scores. Instead, an anonymous survey was provided at the end of class to solicit students' perceptions of the DCA approach (Table 4). After going over each question, the survey was administered and collected by a teaching assistant. There were 44 of 52 students that attended class and responded to the 5-question survey. Questions 1, 3 and 4 were scored with a Likert scale response system: 1. Not interesting, 2. A little interesting, 3. Interesting and 4. Very Interesting. Questions 2 and 5 were scored with questions: 1. Not at all, 2. A little, 3. A good amount, 4. A lot.

The class demographic characteristics are provided in Table 5 to provide an overview of the survey participants. The students were 20 years of age on average and predominantly juniors. This shows a slightly older class, which could influence both participation and sat-

Table 4. Class Survey

Please rate your level of interest with the data analysis section (circle one)			
Not interesting	A little interesting	Interesting	Very Interesting
To what extent did collecting data for the class project help you with your analysis for the class project? (circle one)			
Not at all	A little	A good amount	A lot
Please rate your level of interest with the data collection process (circle one)			
Not interesting	A little interesting	Interesting	Very Interesting
Please rate your level of interest with the data analysis (circle one)			
Not interesting	A little interesting	Interesting	Very Interesting
To what extent has the data analysis section helped your understanding of microeconomics? (circle one)			
Not at all	A little	A good amount	A lot

isfaction with the DCA approach. That is, juniors often have a better idea about how to handle academic processes and deal with their class workload. The class was largely male and the class GPA was distributed from 2.0 to 4.0. This represents a good dispersion of academic achievement, but may underrepresent females, which is common in both agricultural economics and economics. About 25 percent of the students had to live on campus and about 20 percent were in a fraternity or sorority. About 20 percent were involved with ROTC or an organized school team. The majority of students did not work, although a few worked more than 20 hours per week. Overall, the students were active in other activities outside of the classroom.

The results of the student evaluation survey are provided in Table 6. The average value of responses for each question is greater than the midpoint (2.5), which suggests that students had favorable perceptions of the project with respect to the five questions in Table 6. Further, the standard deviation for all responses was less than a full step indicating little variability in student perceptions.

Table 5. Class Characteristics

Variable	
Age (mean)	20.44
Gender (0 = male; 1 = female)	32.7%
Academic year in school 1 = frosh, 2 = soph, 3 = jr, 4 = sr, 5 = grad, 6 = other)	3.12
Approximate GPA	
0 - 2.0	0
2.0 - 2.5	4
2.5 - 3.0	26
3.0 - 3.5	18
3.5 - 4.0	3
Required to live on campus	13
Part of fraternity or sorority	10
Part of the ROTC or a similar organization	2
Part of an organized school sports team including club teams	9
Hours per week at a job on campus?	
0	38
1 - 10	5
11 - 20	5
20+	4
Hours per week at a job off campus?	
0	41
1 - 10	4
11 - 20	5
20+	2

Table 6. Class Survey Results

	Q1 *Interest w/ analysis section*	*Q2* *Helped w/ project*	*Q3* *Interest w/ data collection*	*Q4* *Interest w/ data analysis*	*Q5* *Helped w/ microeconomics*
Average	2.95	2.91	2.64	3.10	2.82
St. Dev	0.65	0.77	0.89	0.59	0.66
Max	4	4	4	4	4
Min	1	1	1	2	1
Count of 1's	1	1	5	0	1
Count of 4's	7	10	7	10	5
Correlation					
Q1	1.000				
Q2	0.085	1.000			
Q3	**0.334**	**0.356**	1.000		
Q4	**0.381**	0.047	0.073	1.000	
Q5	0.309	0.013	0.282	0.261	1.000

Scoring for Q1, Q3 and Q4:
1. Not Interesting, 2. A Little Interesting, 3. Interesting and 4. Very Interesting
Scoring for Q2 and Q5:
1. Not At All, 2. A Little, 3. A Good Amount, 4. A lot.

The average scores for the data analysis section of class (Q1) and for how data collection helped with the data analysis project (Q2) are relatively high. So even though students might have disliked collecting the data, it may have helped them with the data analysis learning objectives. Further, there were many more high scores (Q1 = 7, Q2 = 10) than low scores (Q1 and Q2 = 1).

Students seemed to have a strong interest in the DCA approach (Q4), although the data collection itself was rated the lowest (Q3), which is not overly surprising given the extra work it required (even though they received points for doing so). This may be consistent with Dickie (2006) who found that economic experiments increase learning whereas grade incentives to participate do not. The lowest response for Q4 was A little interesting; there were no ratings of Not interesting for Q4; and Q4 had the largest share of very interesting ratings. All of this suggests that the DCA approach was appealing to most of the students.

A little concerning is that Q5 had the lowest number of high scores (5) and its mean score was the second lowest (2.82). This could indicate that students had a difficult time relating the data analysis to microeconomics, which could be due to the instruction or because combining microeconomics and analytics in one undergraduate class is too challenging or abstract for undergraduates. An alternative explanation could be the heterogeneous make-up of the class. The class contained upper-level economics majors as well as second-year agricultural economics majors. The former group had already been exposed to many of the microeconomic concepts and analytics discussed in class. The latter group was seeing this material for the first time. As such, the level at which the topics were taught may have been too low for some and too high for others.

The correlation of the questions suggests that scores for Q1 and Q3, Q4 are most highly correlated. Further scores for Q2 and Q3 are highly correlated as well. Since Q1, Q3 and Q4 all pertain to data analysis it is not surprising that the responses are correlated. Similarly, since Q2 and Q3 relate to the class project, a major grade in the class, it is not surprising their scores are correlated.

As noted by a reviewer of this study, 100 percent participation in any survey is uncommon and could have affected the perception of the DCA. Since the DCA project was a major part of the students' overall grade, students may have felt unfairly coerced into participation. This may have biased downward student evaluations of the learning approach.

Discussion

Experiential learning is becoming increasingly important in university teaching. Hawtrey (2007) suggests that this is particularly true as the mission of universities reflects a commitment to develop-

ing more generic student skills and vocational learning. Students want and expect more practical applications of learning rather than standard lectures and rote memorization. Further, students as customers are demanding a greater level of quality. As most agricultural economics departments are at land-grant universities, this mission-focus may be even more prevalent.

The DCA approach attempts to improve the quality of classroom instruction by engaging students with an experiential learning experience. That does not necessarily mean the approach is ideal or even effective. To that point, there are (at least) two important questions regarding the use of a classroom experience: 1. Does it work? and 2. Why does it work? With regards to point 1, the instructor did not explicitly measure whether or not the approach works in terms of class performance. The small sample survey suggests a positive experience for the students. This is not compared to a baseline group, however. Comparative analysis of the DCA approach in the future could be informative.

With regards to question 2, the survey results suggest that the DCA approach helped increase students interest in data analysis. This can be important as undergraduate students can be intimidated by analytical methods. At the same time, improvements can be made with connecting the DCA approach to microeconomic theory. This could also suggest that the DCA approach may be more appropriate or relevant in an undergraduate quantitative analysis course or a more topical applied economics course.

Optimistically, there are many potential applications with this approach. In terms of what data to collect, the DCA approach could easily be constructed to facilitate hedonic pricing models as well. For example, students could individually or in teams monitor different sets of prices over time and space. This could be for anything ranging from food to housing to gas prices. Given the amount of information available online, an industrious student could easily put together an interesting and worthwhile data set with limited instruction or guidance. Similarly, students could gather large amounts of grocery store marketing data including prices, coupons and in-store promotions.

This approach could also be used as an application for other applied economics topics as well such as environmental or natural resources or community development. With some creativity and the benefit of sufficient numbers, an interesting data set could be created and analyzed, allowing students to explore their hypotheses of interest. Clearly, more versions of this approach would help to identify potential improvements.

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