

Quality Approaches in Higher Education



Measuring the impact of experiential learning on students' understanding of quality management techniques.

Using Quality Management in Experiential Learning to Facilitate Collegiate Operations Improvement and Foster Student Growth: A Case Study

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Abstract

This case study focused on the extent to which business management students who engaged in a service-learning experience as part of an undergraduate operations management course gained an understanding of quality management practices. Students reported that the service-learning experience provided them with a greater understanding of quality management techniques and that they were better able to engage in problem solving, more likely to seek data to evaluate issues, and feel more confident in their knowledge of operational issues. Further, students indicated in their future careers, they would identify opportunities for improvement in their work, seek to be part of problem-solving teams in the workplace, and adopt a systematic approach to solving work-related problems. In addition, the client of the service-learning project provided positive feedback about the recommendations that resulted from output of the project and started to implement the recommendations.

Keywords

Operations Management, Quality Management, Service-Learning, Academic Advising Strategies, Student Retention, Lean Six Sigma

Introduction

An institute of higher learning (IHL) is similar to any other type of organization that entails a variety of operations. Operations are comprised of processes that lend themselves to evaluation and continual improvement. The techniques of quality management (QM), such as plan-do-check-act (PDCA) and Lean Six Sigma (LSS), are frequently used to effect such improvement. Nevertheless, IHLs do not necessarily embrace these techniques as part of their management practices.

Undergraduate operations management (OM) curricula typically cover quality techniques, which are part of the OM body of knowledge. Due to the breadth of OM, however, it is unlikely that students leave an OM course with a sufficient understanding of essential quality techniques necessary for their future careers. Thus, if the techniques of quality could be explored in depth during an OM course, a stronger foundation in quality practices may result, which would benefit students in their future endeavors.

This case study concerns whether the use of experiential learning, delivered in terms of a QM-centered academic service-learning project within an IHL, strengthens the understanding of quality techniques for students enrolled in an undergraduate OM course. The case study also concerns whether such pedagogy may influence the students' use of such quality techniques in their future careers.

Literature Review

The concept of experiential learning has its roots in the work of Dewey (1897). Dewey put forth the idea that education is an interactive and social process, and that educational

institutions are social institutions and can be used to promote social change. Thus, education should reflect the needs of society, with the role of the teacher to facilitate a student's learning by actively engaging the student to apply his or her learning to a defined problem. To maximize this engagement of the student, Dewey (1938) believed that teachers must balance education between traditional and progressive pedagogy, with progressive pedagogy's encompassing a type of education that requires active participation in social, political, and economic decisions that will have an impact on students' present and future lives. Further, education should provide an experience that is not only beneficial to the community but also educationally sound in terms of the academic subject matter, thereby providing the needed balance. Dewey argued that this balance enables learning outcomes to be carried forward by the learner, providing for continuity of the learning experience.

Based on Dewey's perspective, Kolb (1984) delineated an experiential learning cycle that includes four components: concrete experience, reflective observation, abstract conceptualization, and active experimentation. The first component is the concrete event experienced by the learner. The second component is the learner's reflections on the experience. This reflection then leads to the third component, which is the learner's conceptualization of the implications for future actions. The fourth component is the learner's implementation of the actions, which creates a new concrete experience providing for a continuity of experience, similar to that put forth by Dewey.

An application of experiential learning is academic service-learning. Indeed, Bush-Bacelis (1998) defined academic service-learning as "a method by which students learn and develop through active participation in thoughtfully organized experiences that meet actual community needs and are coordinated with the academic and local communities" (p. 20). The benefits of academic service-learning are well documented.

According to Bush-Bacelis (1998), a significant benefit of academic-service learning for students is "they are able to connect the readings, class discussions, and other assignments with the real world, full of real people, with real problems that students try to help solve" (p. 27). Bush-Bacelis believes that one result of such learning is the ability of the student to apply abstract concepts to addressing organizational issues. Papamarcos (2002) argued that such learning leads to more positive outcomes in terms of skill levels, academic performance, social responsibility, personal development, self-reliance, and related ideas.

The community organizations served by academic service-learning also appear to benefit. Walsh (2002) stated that academic-service learning provides "insights that may be genuinely helpful to business operations" (p. 233). Crutsinger, Pookulangara, Tran, and Duncan (2004) reported positive feedback from the

service-learning recipient of an advanced merchandising applications course. Papamarcos (2002) noted the importance of the sustainability of the project outcomes after project completion.

Notably, the IHL provides a community that could benefit from a QM-based academic service-learning experience. Specifically, an academic service-learning project focused on the academic advising process can provide a means to teach quality techniques as well as to benefit the IHL.

Colleges and universities struggle to recruit and retain students, partly because the retention and graduation rates of IHLs influence the amount of federal and state funding available to such institutions (Shields & Gillard, 2002). Additionally, the current administration has proposed linking federal aid to colleges and universities with student outcome and performance (Doubleday, 2013). Student retention is a key component of outcome and performance, and academic advising is considered a key contributor to retention (Drake, 2011).

Drake (2011) presented anecdotal evidence of the positive effect of academic advising. In his review of 40 years of research on student persistence, he found three factors are consistently noted. The first factor is connecting the student to the IHL by way of learning support systems early in the student's academic career. The second factor is the use of first-year programming, such as learning communities, while the third factor is effective academic advising. Cuseo (as cited in Drake, 2011) stated that proficient advisors affect retention positively by helping students enhance their enjoyment of college life and engage effectively in making decisions about their educational path and career growth.

Purpose and Research Questions

The purpose of this study is determine whether business management students in an undergraduate OM course gained a deeper understanding of quality techniques through the use of experiential learning and whether this deeper understanding encouraged students to embrace QM practices in their future careers. An additional purpose was to determine whether the academic service-learning project benefited the college. To this end, the following research questions guided the study:

Research Question 1: To what extent did the students perceive the academic service-learning project as adding to their understanding of QM practices?

Research Question 2: To what extent did the students believe that the academic service-learning project would influence their future behaviors in terms of using QM practices?

Research Question 3: To what extent did the college, as the client, perceive the academic service-learning project as valuable to improving the academic advising process?

To better understand how these research questions will be answered, a presentation of the context of both the course and the

problem-solving endeavor used by the students follows. In essence, the problem evaluated by the students is not the study itself, but rather the means to the study. This study is not focused on the outcome of the problem-solving event presented below, but rather on the influence of that problem-solving event on student learning. It is further focused on the future career intentions of the student with regard to quality and the influence of the event on future endeavors.

Overview of the OM Course

The 15-week, senior-level OM course emphasizes the nature of OM and its inter-relationship with quality. This course is an applied class, as the students build on the concepts and themes learned earlier within their initial OM course. Quality concepts were introduced in the earlier OM course, but this applied course focuses on applying quality practices. The initial OM course provides the student with a conceptual understanding of the OM body of knowledge. The general goals of this second OM course are to gain exposure to the various activities and decisions that involve an operations manager, learn about the trade-offs associated with these decisions, and acquire the conceptual and empirical tools for improving an organization's performance.

In the spring 2013 course, 19 traditional, full-time college students (12 males and seven females) were enrolled. These students majored in business administration, with a concentration in management. This course section met weekly for two and a half hours.

The overarching goal of the course was to apply the concepts of LSS to improve the academic advising process in the Business Administration Department (BUAD). For this project, improvement meant gains in efficiency and effectiveness. During class, learning centered on a conceptual understanding of QM practices and techniques as they apply to the academic advising process, with an emphasis on LSS and its systematic problem-solving model of define-measure-analyze-improve-control (DMAIC). Between class meetings, the students applied the conceptual learning to the advising project, in terms of the DMAIC model, which resulted in deliverables to present at the next in-class meeting. For example, after an in-class discussion on measure, the students determined their measurement plan for the academic advising process and implemented that plan such that data were collected to describe the process behavior. At the next class, time was spent on evaluating that data as a class and then using that data to segue to the next phase of DMAIC—analyze.

Toward the end of the semester, the students prepared a report that described the project and included all phases of the DMAIC model. The professor provided this report to the collegiate client, the chair of the BUAD. The professor also furnished two copies of the reports to the leadership of two local sections of the American Society for Quality (ASQ), who then invited interested students to present the project to a joint dinner meeting of these sections.

Overview of the LSS Academic Service-Learning Project

LSS employs five essential phases to effect an improvement in a process systematically (Keller, 2011). These improvements may be in terms of efficiency as well as effectiveness, where efficiency is gained by eliminating or minimizing waste, and effectiveness is gained by achieving consistency in meeting identified targets with virtually zero defects. Each of the five phases of LSS has a specific goal, and each phase has different tools associated with it, some of which overlap phases (Keller, 2011). The define phase has the aim to identify the project's scope, goal, and objectives as well as to understand the high-level process and that process's stakeholders, inputs, outputs, and functionality (Keller, 2011). The goal of the measure phase is to understand the process at a more detailed level, identify metrics to characterize the process, and measure the process at a base level to serve as a basis for improvement (Keller, 2011). The analyze phase must aim to identify the influencers of the process's performance (Keller, 2011). The goal of the improve phase is to identify new process operating conditions and improvement recommendations (Keller, 2011). The control phase focuses on establishing a plan to ensure that gains in improvement are sustained (Keller, 2011).

To begin the project, students were asked to view various videos on LSS prior to an in-class exercise and overview discussion on the topic, both of which occurred during the same class period early in the semester. When the class met, the students participated in a mock process of a production line facilitated by the professor. After running the mock production line, the professor facilitated a discussion of the DMAIC model in which the students were asked to improve the production line in several ways, such as reducing flow time and defects. In this way, the students received an overview of the DMAIC model, which set the stage for the more detailed DMAIC work for the academic advising process.

The next week, the BUAD chair visited the class to provide information on BUAD's advising process. In preparation for that visit, the professor asked students to seek out information on advising, including secondary research and anecdotal primary evidence by speaking to various students who had experienced the BUAD advising process. The following week, in discussion with the BUAD chair, the students began to administer the DMAIC model.

It should be noted that as the project progressed, it became clear that it was emerging more in terms of a DMADV project than DMAIC. DMADV is an acronym for define-measure-analyze-design-verify. This became clear when the students noted limited data were available to directly measure the process, and the project was being driven from establishing customer requirements, resulting in an analysis of customer needs and a subsequent re-design of the advising process. However, this information became known

as the project was administered, after the conceptual groundwork was laid in terms of DMAIC. As a result, although the DMADV model was then discussed in class, it was decided to execute the project in terms of the DMAIC model, as the important aspect of the course was systematic use of quality tools to achieve a particular goal. Additionally, because of the strong similarities between the two methodologies, Keller (2011) notes some organizations simply choose to use the DMAIC nomenclature for the sake of simplicity.

Define

At this college the average four-year BUAD graduation rate for the 2001-2006 cohorts was approximately 37%. As noted earlier, one factor that may influence retention rate is academic advising (Drake, 2011). This provides a rationale for focusing on academic advising.

After listening to the BUAD chair's presentation, the students asked questions of the chair related to the attributes of the BUAD advising process. This provided an opportunity for the students to better understand the high-level current academic advising process. This information was used in the suppliers-inputs-process-outputs-customers (SIPOC) diagramming tool to establish the boundaries of the project.

The students then worked as a group to determine questions for focus groups with students who had been counseled by the BUAD advisors. The focus groups were administered outside the classroom and resulted in an understanding of what was important to students in terms of BUAD academic advising. These requirements were considered the voice-of-the customer (VoC) for the BUAD academic advising process.

The high-level BUAD academic advising process was mapped to the VoC requirements using quality function deployment (QFD), a tool that facilitates understanding of the requirements that please a customer and the process attributes that are essential to those requirements. This tool demonstrated the need to improve the student-faculty advising meeting and that the assignment of the advisor was a significant factor in terms of the VoC requirements.

Measure

Three aspects of the academic advising process were measured: how the advisor was assigned, how the advisors conducted the advising meeting, and how satisfied the students were with the advising meeting. The first two aspects were evaluated through face-to-face interviews with the individual who assigned advisors (the administrative assistant) as well as with the advisors themselves. Advisee satisfaction was evaluated by using a confidential online survey.

In evaluating the comments provided by the administrative assistant who assigned advisors, the students found that advisors were assigned primarily on the basis of workload alone, as the average number of advisees per advisor is 60 students. Thus,

the administrative assistant simply assigned advisors to students so that the workload for advisors was somewhat balanced. Additionally, sometimes students requested a certain advisor, and this was taken into consideration as well.

Nine of 12 advisors agreed to be interviewed. Each advisor was asked to describe his or her approach to the administration of the advising meeting; advisors were also asked to identify his or her time allocations to prepare for the advising meeting as well as for the actual advising meeting. Finally, they were asked what would make the advisement process better.

In evaluating the responses from the interviews, the students determined that each advisor conducts the academic advising function differently, with varying degrees of interactions and interventions on behalf of the students. Advisors spend an average of 27.1 hours per semester on advising functions, including preparation and the advising meeting. The average salary of faculty who advise is \$45/hour, equating to \$1,219.50 per semester per full-time faculty, or \$14,634 per semester (\$29,268 per academic year). Advisors also were asked to give their perspectives on how the academic advising process could be improved. Faculty indicated a need for compensation or an incentive to encourage quality academic advising because much of their required work (research, service, and teaching preparation) is not considered a priority during the college-defined advising week; the priority is advising.

To evaluate BUAD students' satisfaction with the academic advising meeting, the researcher administered an online confidential survey tool, Qualtrics™, to students served by the BUAD after their academic advising meeting. The response rate was 20%. Approximately 43% of students indicated their advisors did not provide them with personal advising, nor did advisors effectively respond to questions and concerns in terms of solving difficulties with course selection and registration. In addition, 35% of students did not feel the advisor provided accurate information needed to ensure timely graduation, and 62% of students did not feel their advisor provided information about clubs, scholarships, and internships that might be available. Finally, 21% of students did not feel their advisor provided enough office availability during advising week.

Analyze

The students utilized the common root-cause techniques of fish-boning and "5 Whys" to determine the key factors that contribute to a lack of student satisfaction. These key factors included a lack of standardization in terms of advisor assignment and in executing the advising meeting.

Improve

The improvement recommendation that was generated during the analysis phase was to change the advising model of BUAD

to use one full-time academic advisor. This advisor would be available throughout the year and would develop a list of courses for each student as well as identify mentors for each student from willing faculty, who would receive incentives to function in this role in terms of service or teaching credit. The full-time advisor would be allocated a salary of \$26,000 a year.

In addition, the model would include the use of student advising coaches, whose offices would be located in the tutoring center. These coaches would offer the students peer advice in regard to handling class workloads, finding class formats that fit with the student's style of learning, and learning how to study. This aspect of the model would help students to form a relationship with peers in BUAD, as well better prepare them for meeting with the academic advisor. This was accomplished by providing the student with insight into particular courses in terms of workload and into the teaching styles of different professors.

The students discussed this model with focus groups of advisors, BUAD students, and the BUAD chair, who received this model favorably, according to student reports. Further, the BUAD chair stated the model was feasible in terms of budget.

Control

To ensure the sustainability of this model, the students recommended establishing a comprehensive job description for the academic advisor, faculty interested in the mentoring aspect of the model, and student coaches. The training for these jobs would be a key component of successful implementation, and, as such, the chair of BUAD or his designee would conduct the training to ensure consistency.

The survey used in the measure phase of the project would be administered after each semester's advising week. The results of the survey would be used for continual improvement purposes. Additionally, the retention rate for BUAD cohorts could be monitored as a metric that may give further insight into the effectiveness of the advising process in BUAD.

Methodology

This case study employed a mixed-methods approach. Quantitative data consisted of responses to Likert-scaled items, while qualitative data comprised responses to open-ended questions administered in an interview. Two instruments, discussed in detail in the Instrumentation section, were used.

After the conclusion of the semester, the professor developed a survey instrument to determine the extent to which OM students perceived the academic service-learning project as adding to their understanding of quality practices as well as the extent to which the students believed the project would influence their future behaviors in terms of using quality practices (Table 1).

The responses to this survey were used to address research questions 1 and 2.

The survey was administered using the online survey tool, Qualtrics, which allows for gathering data anonymously. The administrator, who, in this case, is the professor, is responsible for the data analysis. The link to the survey was emailed to the students via the college's learning management system. The link was accompanied by an email that included the purpose of the survey and noted the student could opt out of the survey if he or she did not wish to participate.

After the distribution of the report to the BUAD chair, the professor of the OM class requested an opportunity to interview the BUAD chair about whether the project findings and recommendations were perceived as valuable in regard to improving the BUAD academic advising process. The semi-structured interview protocol used by the professor is presented in Appendix A.

Instrumentation

As noted, two instruments were used in this study. Responses to the Student Perceived Understanding and Future Applications of Quality Practices Survey (Table 1) were used to address the academic service-learning project in terms of student understanding of quality practices as well as their future intent to use such techniques. Responses to the Collegiate Client Impressions of the Advising Academic Service-Learning Project Questions (Appendix A) were used to address the collegiate client perceptions of the value of the project outcomes.

Student Perceived Understanding and Future Applications of Quality Practices Survey

This survey contained 12 positively-stated declarative statements intended to assess two student-centered dimensions of the project: student understanding of quality practices and student intent to use quality practices in the future. Items 1-5 concerned the students' understanding of quality practices, while items 6-12 concerned the students' intent to utilize quality practices in their future careers. The items were answered on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The response rate for this survey instrument was 60% (12 of 20 students). Means and standard deviations were determined for each item as well as for each student-centered dimension of the project.

Collegiate Client Impressions of the Advising Academic Service-Learning Project Questions

These questions were administered via an interview format to determine whether the collegiate client, the BUAD Chair, found value in the recommendations provided by the students

(Appendix A). These questions were open-ended, which allowed for in-depth responses.

Data Analysis

This case study utilized both quantitative and qualitative data. Research questions 1 and 2 were addressed by the quantitative data, and research question 3 was addressed by the qualitative data.

Research Question 1: To what extent did the students perceive the academic service-learning project as adding to their understanding of quality practices? This question was addressed through the responses provided to items 1-5 of the Student Perceived Understanding and Future Applications of Quality Practices Survey. Means and standard deviations were determined for each item (1-5). The academic service-learning project would be considered as adding to the students' understanding of quality practices if the overall mean for the total of items 1-5 had a value between 4 and 5 (agree or strongly agree), with a standard deviation of less than 1.0.

Research Question 2: To what extent did the students believe the academic service-learning project would influence their future behaviors in terms of using quality practices? This question was addressed through the responses to items 6-12 of the Student Perceived Understanding and Future Applications of Quality Practices Survey. Means and standard deviations were determined for each item (6-12) as well as the total score of these items.

The academic service-learning project would be considered as contributing to the students' future use of quality practices if the overall mean for the total of items 6-12 had a value between 4 and 5 (agree or strongly agree), with a standard deviation of less than 1.0.

Research Question 3: To what extent did the college client perceive the academic service-learning project as valuable in improving the academic advising process? This research question was addressed through the responses to the interview with the BUAD chair, as guided by the Collegiate Client Impressions of the Advising Academic Service-Learning Project Questions. The academic service-learning project would be considered valuable to the collegiate client if the summary of comments was positive in nature.

Results

Research Question 1: To what extent did the students perceive the academic service-learning project as adding to their understanding of quality practices? The mean and standard deviation for all items across all respondents for items 1-5 were 4.36 and 0.70, respectively (Table 1).

In evaluating the summarized means from Table 1 for each individual inquiry related to understanding quality practices, the means ranged from 4.0 to 4.8, with the most frequently noted

Table 1: Mean and Standard Deviations for Student Perceived Understanding and Future Applications of Quality Practices Survey

Question	Student Perception of Understanding Quality Practices	M	SD
1	Because of the project, I have a much greater understanding of quality practices.	4.40	0.55
2	Because of the project, I am much more confident in discussing operational issues.	4.00	0.55
3	Because of the project, I now believe that quality is an intricate part of operations management.	4.40	0.89
4	Because of the project, I believe that most problems are a result of operational deficiencies outside of human error that can be managed.	4.60	0.55
5	Because of the project, I believe some sort of data is necessary to know whether a problem solution is effective.	4.80	0.45
Student Perceptions of Intended Future Behaviors			
6	To what extent do you feel that the course emphasis on quality will change the way that you personally work in the future?	4.00	0.71
7	To what extent are you now likely to identify opportunities for improvement in your work?	4.40	0.89
8	To what extent are you now likely to want to be part of problem-solving teams at work?	4.20	0.44
9	To what extent has the course influenced your approach to solving problems?	4.00	0.70
10	To what extent are you likely to seek out data to characterize issues?	4.60	0.89
11	To what extent are you likely to adhere to the DMAIC problem-solving cycle at work, to the extent possible?	4.40	0.89
12	To what extent do you see yourself working in operational quality in some capacity?	4.40	0.89

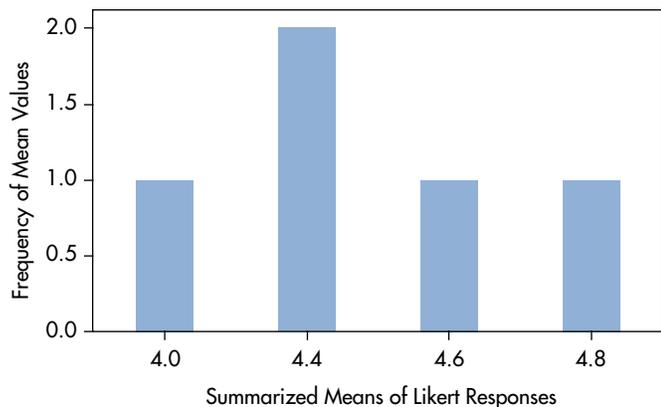


Figure 1: Student Perceived Understanding of Quality Practices. Summarized Means of Likert Responses to Survey Questions 1-5 From Table 1

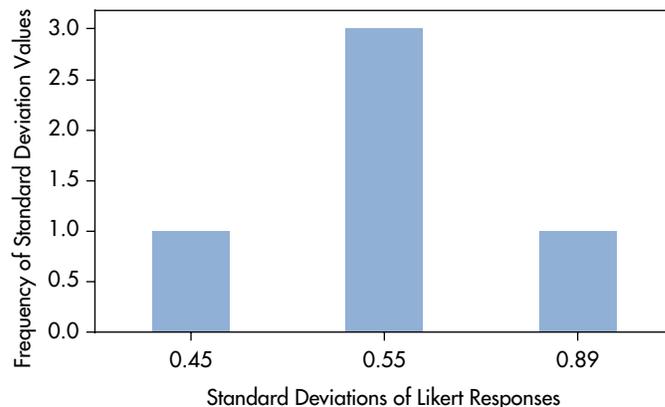


Figure 2: Student Perceived Understanding of Quality Practices. Summarized Standard Deviations of Likert Responses to Survey Questions 1-5 From Table 1

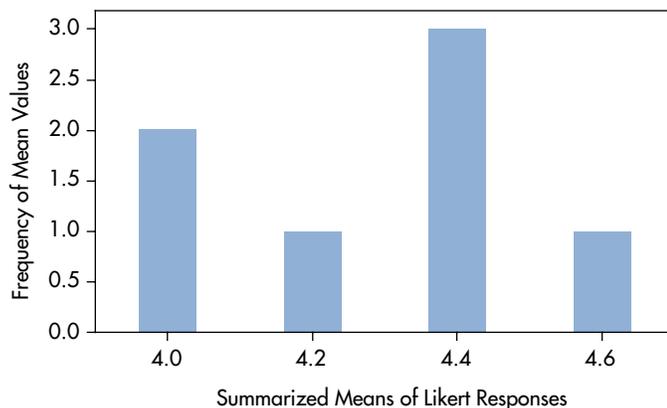


Figure 3: Students' Anticipated Future Orientation Toward Quality Practices. Summarized Means of Likert Responses to Survey Questions 6-12 From Table 1

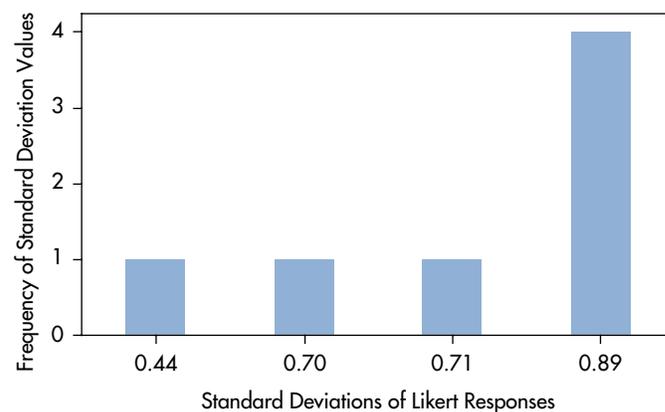


Figure 4: Students' Anticipated Future Orientation Toward Quality Practices. Summarized Standard Deviations of Likert Responses to Survey Questions 6-12 From Table 1

summarized mean as 4.4 (Figure 1). The summarized standard deviations for these data ranged from 0.45 to 0.89, with the most frequently noted summarized standard deviation as 0.55 (Figure 2).

Research Question 2: To what extent did the students believe the academic service-learning project would influence their future behaviors in terms of using quality practices? The mean and standard deviation for all items across all respondents for items 6-12 were 4.42 and 0.69, respectively (Table 1).

In evaluating the summarized means from Table 1 for each individual inquiry related to the students' anticipated future orientation with regard to quality techniques, the means ranged from 4.0 to 4.6, with the most frequently noted summarized

mean as 4.4 (Figure 3). The summarized standard deviations for these data ranged from 0.44 to 0.89, with the most frequently noted summarized standard deviation as 0.89 (Figure 4).

Research Question 3: To what extent did the college client perceive the academic service-learning project as valuable in improving the academic advising process? The summary of the interview responses indicated that the BUAD chair felt positively about the project recommendations and that they were feasible in terms of the budget. The chair also noted that he would like to see the benchmarks of a model that worked in a similar college setting. The chair also indicated that he intends to request funds for a full-time academic advisor.

Discussion

The use of academic service-learning as a means to teach quality techniques and encourage future quality behaviors appears to be effective. Additionally, the data suggest that the collegiate community offers opportunities for such projects and benefits from their use.

The results of the Student Perceived Understanding and Future Applications of Quality Practices Survey support the findings of Bush-Bacelis (1998) and Papamarcos (2002), who indicate that academic service-learning projects strengthen academic learning of abstract concepts. The students who participated in this survey indicated they have a stronger understanding of quality practices and they are more confident in discussing operations management issues. They also indicated a deeper understanding of the implications of QM, particularly in terms of its role within operations, its system focus as opposed to human-deficiency focus, and its dependency on data.

The results of the Student Perceived Understanding and Future Applications of Quality Practices Survey further support the contentions of Dewey (1938) and Kolb (1984), who believe that the implementation of concepts learned is an integral part of experiential learning. The students who participated in this survey indicated that the project will change the way they will work in the future, encourage them to look for opportunities for improvement, rely on data to understand operations, employ systematic problem solving, and consider QM as a career.

The responses to the Collegiate Client Impressions of the Advising Academic Service-Learning Project Questions support the work of Walsh (2002) as well as Crutsinger and Pookulangara (2004), who indicate that organizations which participate as the client in academic service-learning projects receive benefit. The BUAD chair expressed overall positive impressions with the outcome of the project, finding it feasible to implement and began to take steps to hire a full-time academic advisor.

The responses to the client survey also support Papamarcos's (2002) notion that service-learning requires sustainability of the actions recommended after the academic project ends. The collegiate client's intended next steps with regard to the project, as well as the student-recommended control actions, defined within the DMAIC cycle, provide evidence of such sustainability.

Limitations of the Study

This study is limited by several factors. The first limitation is in terms of controls. No control existed to determine whether the academic service-learning project itself enhanced the ability to understand quality techniques or encourage future quality behaviors on behalf of the participating students. It is not

clear whether the same academic benefit or future orientation could be achieved by traditional pedagogy or some other form of high-impact learning other than academic service-learning. Additionally, no control existed for the collegiate client such that it could be determined whether the project itself would influence the students' learning of quality techniques or their intent to pursue QM practices in the future. Finally, no control existed for the professor to determine the extent of her influence on the students' perceptions of learning quality techniques or students' intent to pursue QM practices in the future.

A second limitation is the method of measurement itself. This research relied on a survey that concerned students' perceptions of their understanding of QM and future QM intentions. As a result, the survey could not detect actual academic learning but, rather, only the perception of it. This limitation is also true of students' expressed intent to engage in future QM practices. Additionally, in terms of the collegiate client, only one client was interviewed, offering a very narrow perspective of the value of academic-service learning.

A third limitation concerns the data collected for the study. No data were available to determine the number of contacts that students had with the client, advisors, students, or other participants in the process. These data could help provide information on the level of engagement that students had in the project and how this engagement affected the results.

Recommendations

To overcome these limitations, the study should be replicated in several ways. The first replication should be in terms of repeating the course work with a traditional pedagogy without the academic service-learning component or any other experiential component. In this way, the extent of the effect of traditional pedagogy on quality technique understanding and future use of QM could be separated from the effect of academic service-learning.

The study also could be replicated with an experiential component not linked to an academic service-learning project, which would allow an understanding of the extent of the effect of experiential learning on quality technique understanding and future use of QM. These results might allow for a differentiation between the impact of experiential learning versus academic service-learning.

A different professor might replicate this study, which would allow for a control for the professor's influence on the students' perceptions as well as on collegiate client satisfaction. It also would be helpful to replicate the study using a different collegiate client to determine the effect on the study outcomes.

Consideration also should be given to the method of measuring students' understanding of the academic concepts. Instead

of a survey of perceptions, it would be more valuable to have a more robust data set, such as exam scores. A study also should be performed to determine whether future intentions translate into behaviors. For example, it would be interesting to survey the students after several years to ascertain whether they, indeed, did begin careers in quality or engage in quality practices in the workplace.

In terms of the collegiate client, a broader feedback protocol should be used to better capture the perceived value of the project. For example, it may be helpful to gather feedback on the project from all of the individuals from the client organization who are affected by the project.

Finally, to better understand the engagement of the students within the project, it would be helpful to develop a contact protocol to facilitate the documentation of contact time or engagement time with the project or client from the students' perspective. This protocol documentation could be used to understand relationships between project engagement and student outcomes as well as client perceptions of the value of the project.

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Appendix A

Collegiate Client Impressions of the Advising Academic Service-Learning Project Questions

1. What were your overall impressions with the recommendations provided by the students in terms of academic advising?
2. What is the feasibility of implementation of the recommendations provided?
3. What further data would you have liked to see in the project?
4. What will you do with these recommendations?



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