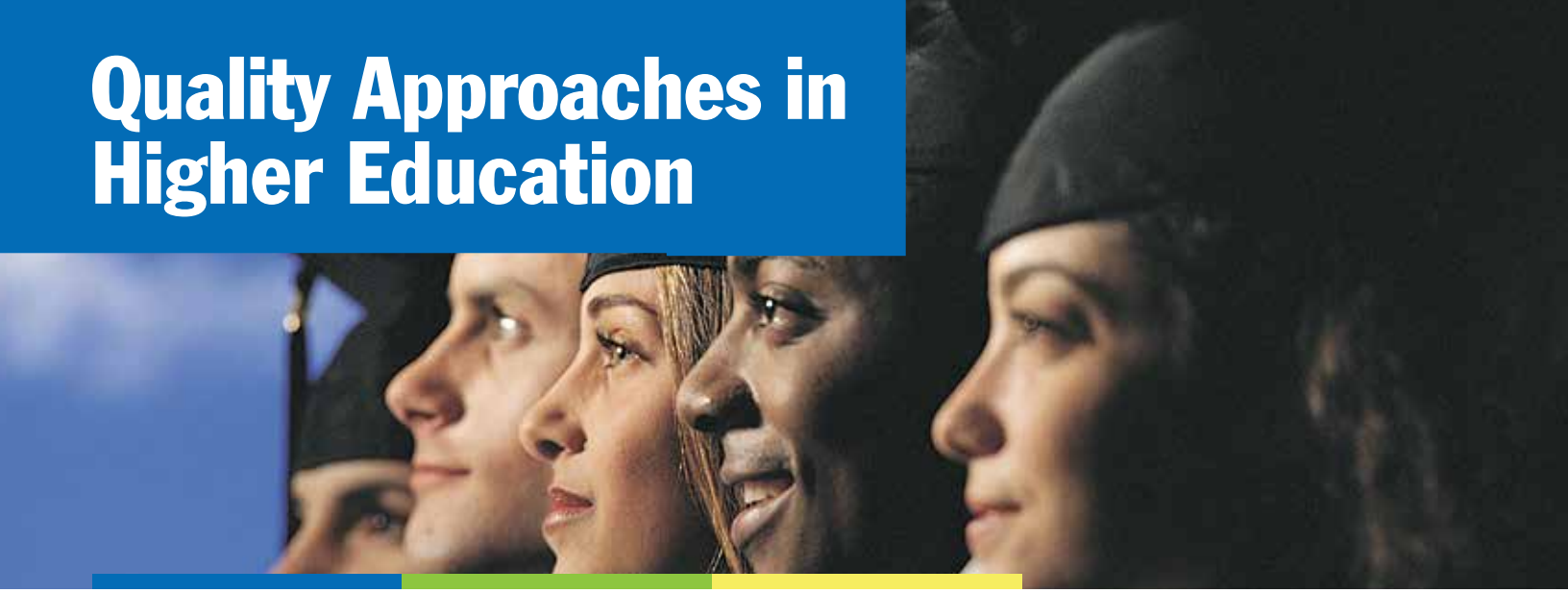
Quality Approaches in Higher Education



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The Journal That Connects Quality and Higher Education

Quality Approaches in Higher Education (ISSN 2161-265X) is a peer-reviewed publication that is published by ASQ's Education Division, the Global Voice of Quality, and networks on quality in education. The purpose of the journal is to engage the higher education community in a discussion of significant topics related to improving quality and identifying best practices in higher education; and expanding the literature specific to quality in higher education topics.

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Note From the Editor

Elizabeth A. Cudney

Elizabeth A. Cudney

As *Quality Approaches in Higher Education* (*QAHE*) enters its sixth year, the advisory board, associate editors, and reviewers continue to strive to utilize quality management principles to improve the journal. As such, we are pleased to announce that *QAHE* is ranked in the *Cabell's Directory*. The main purpose of *QAHE* is engaging the higher education community in topics related to improving quality, identifying best practices, and expanding the literature specific to quality in higher education. Our goal for the journal is to engender conversations that focus on improving educational practices with the use of quality tools throughout the educational experience.

With ever-changing student expectations and industry needs as well as technological advances, quality improvement methods can be utilized in higher education to improve student engagement and empower students to become independent learners and innovators across the globe in the 21st century. This issue highlights innovative approaches and best practices for quality improvement in colleges and universities throughout the world.

This issue is comprised of five articles that focus on assessing learning outcomes, students' changing expectations, course design, coproduction of knowledge, and experiential learning. The first article by Kylie Goodell King and Jeffrey Herrmann describes the development of learning outcomes and rubrics for an honors program, which is part of the university's initiative to apply quality management in higher education. The assessment of the outcomes and elements are also presented and linked to driving continuous improvement in a university setting. The next article by Nazareen Muhammad, Raghava Rao Gundala, Mandeep Singh, and Jessica Harriger focuses on students' expectations and how higher education can address the changing needs of students. The research determines the factors that contribute to students' changes in satisfaction throughout their studies in a business program. The third article by Emily Hixon, Janet Buckenmeyer, and Casimir Barczyk investigates student perceptions of course design quality to assess online offerings. The research provides insight for instructional design and course facilitation. The fourth article by Munirudheen Athakkakath, Azzah Al-Maskari, and A. Kumudha presents a model for coproduction in education that engages students and other stakeholders as co-producers. The proposed model encourages students to contribute by applying process management tools. The final article by Lisa Walters assesses the impact of experiential learning on students' perception of understanding quality management techniques.

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These articles highlight the breadth at which quality approaches can be used to improve curriculum and instruction within higher education at various levels to provide unique approaches to student learning and engagement.

I would also like to take this opportunity to thank Dr. Sid Nair for his dedication and service as an associate editor for *QAHE* for the past three years (2012-14). We greatly appreciate the insight and guidance that you have provided!

Elizabeth A. Cudney, Ph.D. *is an associate professor in the Engineering Management and Systems Engineering Department at Missouri University of Science and Technology. In 2014, Cudney was elected an an ASEM Fellow. In 2013, Cudney was elected as an ASQ Fellow. She was inducted into the International Academy for Quality in 2010. She received the 2008 ASQ A.V. Feigenbaum Medal and the 2006 SME Outstanding Young Manufacturing Engineering Award. Cudney has published four books and more than 40 journal papers. She holds eight ASQ certifications which include ASQ Certified Quality Engineer, Manager of Quality/Operational Excellence, and Certified Six Sigma Black Belt, amongst others. Contact her at cudney@mst.edu.*

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Best Paper Award

The *Quality Approaches in Higher Education* editors will announce an annual best paper award to the author(s) of a paper published in *Quality Approaches in Higher Education*. The award will be announced in January of each year for the best paper from the issues of the previous year and will be based on the largest single contribution made to the development or application of quality approaches in higher education. There is no nomination form for this award.

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Quality Approaches in Higher Education

Driving continuous improvement through the development and assessment of learning outcomes and rubrics.

Learning Outcomes for a Multidisciplinary Undergraduate Honors Program: Development, Measurement, and Continuous Improvement

Kylie Goodell King and Jeffrey W. Herrmann

Abstract

In the University of Maryland's Quality Enhancement Systems and Teams Honors Program, undergraduate students from engineering, science, and business learn to apply quality management tools, improve processes, and design systems. Eight learning outcomes were developed and for each outcome, four elements for assessment. The learning outcomes were mapped to the program's three required courses, and assessments and rubrics were created to measure every element. Faculty, staff, program alumni, and current students participated in the assessment process. This paper describes how learning outcomes and rubrics were developed, how outcomes and elements were assessed, and how these are used to drive continuous improvement. The paper also suggests how other programs can develop a learning outcomes assessment process.

Keywords

Assessment, Learning Outcomes, Continuous Improvement, STEM

Introduction

The Quality Enhancement Systems and Teams (QUEST) Honors Program ("the program"), which began in 1993 as part of an initiative to apply quality management to higher education, is a multidisciplinary honors program for undergraduate students at the University of Maryland. Students are selected from three units: the Robert H. Smith School of Business, the A. James Clark School of Engineering, and the College of Computer, Mathematical, and Natural Sciences. Approximately 90 students are admitted each year, and students are in the program for three years. We use the term multidisciplinary engineering, technology, and management (METM) to describe our program and similar programs that provide students with the opportunity for multidisciplinary collaboration and complex problem solving that requires knowledge from science, technology, engineering, and mathematics (STEM) as well as management disciplines. Moreover, students must integrate knowledge and skills from multiple courses. Multidisciplinary programs like QUEST increase personal and professional development in students (Holley, 2009; Hotaling, Hermann, Fasse, Bost, & Foresta, 2012). Additionally, the program addresses industry needs by giving students real-world experiences in which they see the relevance of their coursework, apply their skills, and practice professional behavior (National Research Council, 2012).

The development and assessment of learning outcomes can benefit a METM program, its students, and industry. It helps program directors understand how well students are learning, and it is a critical component in a data-driven quality management process for guiding curriculum changes. Students benefit from the improvements that help them learn more and from knowing specifically what they should be and are learning. Industry benefits not only from hiring better-prepared students but also from reducing the uncertainty associated with hiring a program's graduates.

This article describes how, since 2010, we have developed learning outcomes and rubrics, how we assess outcomes and elements, and how we use these to drive continuous

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improvement. It lists our program learning outcomes, includes the rubrics for assessing the relevant elements, describes our assessment process, and presents the results of recent assessments. This includes a novel two-dimensional plot for visualizing and comparing the performance of different elements. The article also suggests how other programs can develop and apply relevant learning outcomes and rubrics. Elements of this article appeared in Goodell and Herrmann (2014); that article provides more background and information about our assessment process and its role in continuous improvement.

Literature Review

Developing and using learning outcomes and assessment tools can help an educational program determine what and how well its students are learning and can be used to guide curriculum improvement efforts. Rogers and Sando (1996) and Maki (2002) provide insight and guidance into the process of developing learning outcomes, which should begin with identifying program goals and educational objectives (Davis, Gentili, Trevisan, & Calkins, 2002). One can also use research-based evidence to improve a curriculum (Finelli et al., 2012).

Learning outcome assessment tools that are especially relevant to METM programs include those for project management skills, communication skills, teamwork, and other professional skills. Pinelli, Hall, and Brush (2013) described an assessment of professional skills in an internship program, but these can be difficult to assess in general (Atif, Ibrahim, & Shuaib, 2012; Palmer, 2002; Palmer, 2003; Shuman, Besterfield-Sacre, & McGourty, 2005; Thambyah, 2011).

Efforts to improve our program are related to other efforts to transform engineering education, which include, for example, studies of admissions policies (Holloway, Reed, Imbrie, & Reid, 2014), faculty motivation (Matusovich, Paretti, McNair, & Hixson, 2014), how teaching improvements are adopted (Finelli, Daly, & Richardson, 2014), and perceptions about curriculum changes (Besterfield-Sacre, Cox, Borrego, Beddoes, & Zhu, 2014). In general, faculty is responsible for curriculum change, and learning outcomes and assessment are essential elements (Jamieson & Lohmann, 2009). As a focused program that has enthusiastic faculty, we wanted to develop a data-driven quality management process for guiding curriculum changes.

The following question naturally arises: how can one develop learning outcomes, use them to assess student learning, and drive continuous improvement in project-oriented METM programs? This article presents a case study that describes how our program did this. From the perspective of change categories and strategies (Borrego & Henderson, 2014), one can view these learning outcomes as the products of reflective teachers who, as a faculty learning community, have created a quality assurance strategy.

Background

Undergraduate students in the three participating units apply to the program in their freshman year. Students must have a 3.0 GPA after their first semester to be eligible. After an initial screening and a group interview for the most qualified applicants, approximately 90 students (two cohorts of 45 students) are admitted to the program. Overall, in the Spring 2014 semester, the program had 212 students: 59 seniors, 66 juniors, and 87 sophomores. The two cohorts of freshmen admitted that semester included 38 students from engineering, 35 from business, and 14 from science; 53 students were men and 34 were women.

Students begin the program in their sophomore year and take three required courses (one each year) and two electives in which they learn to apply quality management tools, improve processes, and design systems. (Students typically take one course per semester.) The required courses, Introduction to Design and Quality (IDQ), Systems Thinking for Managerial Decision Making (STMDM), and QUEST Consulting and Innovation Practicum (QCIP), incorporate a variety of learning activities, including multidisciplinary team projects in which the students generate, evaluate, and recommend solutions to real-world problems from industry and government clients (an important practice for engineering education (National Research Council, 2012). QUEST juniors and seniors (from the three participating units) mentor the teams of sophomores in IDQ. Faculty advisors from the three participating units guide the teams of seniors in QCIP. In IDQ, teams are formed to have a variety of majors and diverse demographics. In QCIP, teams are formed by selecting the interested students who are best qualified to tackle the client's problem. In both courses, teams usually have five students from multiple majors.

In the taxonomy described by Jamison, Kolmos, and Holgaard (2014), the QUEST program could be classified as a "market-driven approach" in which the students learn problem-solving skills that will be useful in their professions. Because the students are also in traditional academic majors, their aggregate experience is one of hybrid learning.

In 2010, the program developed learning outcomes during a workshop with other METM programs (the workshop was sponsored by the National Science Foundation and hosted by the program). Additional discussion and editing led to the eight outcomes listed in Table 1 (end of article). These include the four Accreditation Board for Engineering and Technology (ABET) competencies that engineering graduates identified as the most important: ability to function on a team, ability to

analyze and interpret data, engineering problem-solving skills, and communication skills (Passow, 2012). These outcomes were also influenced by Bloom's taxonomy (1956) and Anderson and Krathwohl's revised taxonomy (2001).

For each learning outcome, we identified four elements that correspond to specific skills that the students should be able to do when they complete the program. For each element, we developed rubrics to describe four levels of performance: advanced, proficient, developing, and unacceptable. These are the same levels used in the Valid Assessment of Learning in Undergraduate Education rubrics (Rhodes & Finley, 2013) and by our university's general education program (University of Maryland, n.d.).

After considering the content of the program's three required courses, we mapped the learning outcomes to these courses; that is, we identified the course(s) in which the students learned the elements associated with the learning outcomes. This map enabled us to determine the courses in which elements can be assessed and shows where the curriculum can be changed to improve our students' performance on an element. This map was then enhanced by identifying which activities and assignments in these courses would be used to assess which elements. Five of these learning outcomes are assessed in more than one course (Table 1), and seven are assessed by more than one instance of assessment (more than one exam, paper, or presentation). Most of the assessments are completed by faculty, staff, and students within the program, but some are completed by the mentors, the faculty advisors, or the clients' project champions because they can best evaluate how the IDQ and QCIP student teams perform outside the classroom while completing their projects.

Learning Outcomes and Assessment Mechanisms

The eight learning outcomes, 32 elements, and associated assessment mechanisms that were conducted in the 2012-2013 and 2013-2014 academic years are described in Table 1. An evaluation is an instance of one evaluator considering the performance of one student or team on one learning outcome. The number of evaluations conducted during the Fall 2013 semester is provided. Other semesters noticed similar numbers of evaluations for each learning outcome. The number of evaluations per learning outcome varies for a variety of reasons. Some learning outcomes are relevant to many activities, which allow more evaluations. Some evaluations consider individual students, while others consider teams. There are also differences in the number of teams in each course, the number of evaluators who are available, and the response rates of the evaluators. Table 2 (end of article) lists the rubrics for the elements of all eight learning outcomes.

The learning outcomes reflect the program goals, which include developing students who have specific "hard" skills in quality management, process improvement, and system design. Moreover, the program uses active learning and authentic design projects in which students work on clients' real-world problems. Learning outcomes 1, 2, and 4 describe these specific skills, and learning outcome 3 describes more general skills that support the elements of these learning outcomes.

The program also prepares students to be effective professionals and have successful careers using the hard skills they learn. Learning outcomes 5 to 8 describe professional skills (teamwork, communication, project management, and ethical, professional behavior) that are generally recognized as important for workplace success (Shuman, Besterfield-Sacre, & McGourty, 2005).

The learning outcomes assessment (LOA) process is designed to support continuous improvement of the curriculum. The process involves a variety of individuals, some of whom play multiple roles. The program's Curriculum Review Committee (CRC) plays a major role. In the Spring 2014 semester, the CRC had 13 members, including seven members of the faculty (one from computer science, one from engineering, and five from business, the administrative home of the program), one program alumna, four students from the program, and one member of the program staff. The CRC includes the program leadership and the instructors of the core courses. Some (but not all) of the QCIP teams' faculty advisors are members of the CRC; those who are not are from the three participating units. Each QCIP project has a project champion representing the client who is sponsoring the project. (In the Fall 2013 semester, there were 13 QCIP projects.) Each IDQ team has a mentor, a student who has already taken the course. In the Spring 2014 semester, there were nine teams in IDQ, and three engineering students and six business students were mentors.

Before the semester starts, the program leadership and course instructors meet to review the LOA plan and determine the timing of assessments in each course. Assessments are assigned to members of the CRC, the QCIP faculty advisors, and the QCIP project champions. At the beginning of the semester, the CRC meets to review the LOA plan and assignments. During the semester, the CRC members complete the assessments. The program leadership and course instructors meet monthly to discuss the completed assessments and identify opportunities to address areas where overall student performance is weak by including additional reviews or practice that semester. At the semester's end, the CRC reviews the assessment data and discusses opportunities to enhance the courses and the LOA plan. The program leadership also discusses the results with university administrators (the

dean of undergraduate studies and the associate deans from the three participating units).

With this process, we can see changes in the performance of the elements over time, which, like a process control chart, can indicate when something is undesirable and an improvement is needed (such as new activities in a course). Thus, the LOA process drives continuous performance.

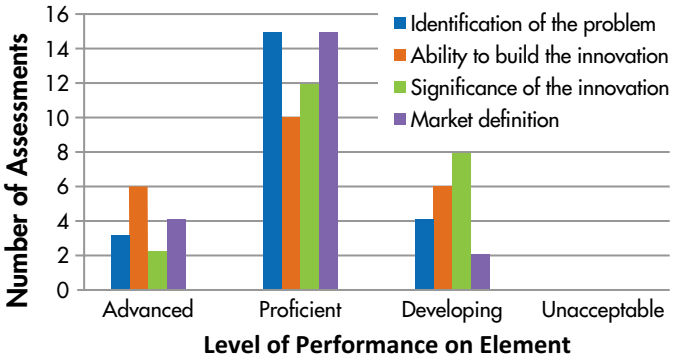
We can also use the record of performance to verify whether a curriculum change is making a difference. If so, then we have evidence that the improvement is working and can continue. (If not, then we need to reconsider our approach.) For instance, increasing the emphasis on using quality management tools (learning outcome 1) in IDQ has increased the students' performance on those elements.

In the 2014-2015 academic year, we will implement an online system for reporting, storing, and analyzing assessment results. This system will reduce the effort needed to generate reports and thus enable prompt feedback and more specific results, which can accelerate the continuous improvement cycle.

Results

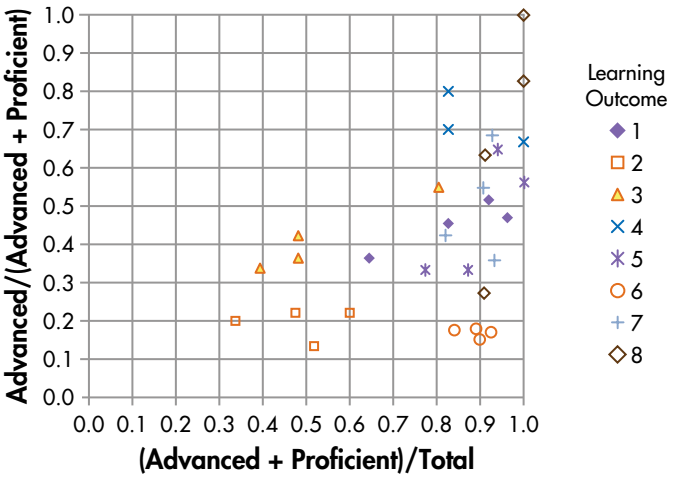
The collection of LOA data began in the Spring 2013 semester. Because this article is about our LOA process, some recent results are presented to illustrate the way that we summarized the data.

In the Spring 2014 semester, the program learning outcomes were evaluated using the rubrics, and, for each type of document or presentation, we created a histogram that shows, for each element, the number of evaluations at each level of performance: advanced, proficient, developing, and unacceptable. Because these evaluations use an ordinal scale, we summarized the data using counts instead of means. Due to space constraints, we cannot include all of these in this article. Figure 1 displays one such chart, which summarizes the evaluations of the final presentations in IDQ during the Spring 2014 semester.



The evaluations of the final presentations in IDQ during the Spring 2014 semester based on the level of performance in each of the 32 elements. This is one example of how data was summarized using counts instead of means.

Figure 1: Assessment of the Elements of Learning Outcome 1 From the IDQ Final Presentation



Each of the 32 elements were evaluated based on the fraction of all evaluations that were advanced or proficient and the fraction of the advanced and proficient elements that were advanced.

Figure 2: Relative Performance of the 32 Elements of the Learning Outcomes Based on Assessments Collected During the Spring 2014 Semester

The relative performance on the 32 elements was determined by first aggregating all of the assessments on each element to determine, for each element, the number of evaluations in which performance was advanced (which we denote as N_a), the number of evaluations in which performance was proficient (N_p), and the total number of evaluations (N_t). Note that the total number of evaluations also includes the evaluations in which performance was developing or unacceptable.

To normalize the results (because the number of evaluations varied), for each element we computed the following two fractions: $p_1 = (N_a + N_p)/N_t$ and $p_2 = N_a/(N_a + N_p)$. The first indicates the fraction of all evaluations (on that element) that were advanced or proficient. The second indicates the fraction of the advanced and proficient elements that were advanced if $N_a + N_p > 0$. For example, if, for some element, all of the evaluations were advanced, then $p_1 = p_2 = 1$. If, for some element, all of the evaluations were proficient, then $p_1 = 1$ but $p_2 = 0$. If, for some element, one-fourth of the evaluations were advanced, another one-fourth were proficient, and the remainder were developing or unacceptable, then $p_1 = p_2 = ½$.

Figure 2 depicts the performance of all 32 elements using these two fractions. The abscissa (horizontal axis) measures p_1,

and the ordinate (vertical axis) measures p_2. The symbols represent the different learning outcomes. This figure indicates which outcomes and elements need more investigation, while the detailed assessments describe specifically where student performance can improve. The results show that the elements for learning outcomes 2 and 3 had the lowest values of p_1, which means fewer evaluations (as a proportion of those evaluated) were advanced or proficient. The elements for learning outcome 6 had large values of p_1 but low values of p_2, which indicate that most evaluations were proficient but not advanced. Some elements for learning outcome 8 had large values of both p_1 and p_2, which indicates that most evaluations were advanced. Our improvement efforts after that semester focused on improving the product development and data analysis activities in IDQ, the course in which students learn these skills.

Limitations

These results and the experiences of conducting these assessments have indicated some opportunities for improving the assessment process. The number of assessments for each learning outcome was not consistent (min = 4, max = 84) due to the variety of assessment techniques and operational constraints. Some evaluators may have assessed students relative to their expected performance in each course (that is, a reviewer may hold lower standards for sophomores in IDQ than for seniors in QCIP). The evaluators need to understand the purpose of program learning outcome assessment and how it differs from grading student work. The evaluators need to have a common understanding of what level of performance corresponds to the different levels on each element. More precise rubrics would allow consistent evaluations to be obtained from a number of different evaluators. In addition, this process, designed for evaluating program learning outcomes, does not provide feedback to individual students about their performance (although the grades on assignments do).

Summary and Conclusions

By comprehensively assessing its learning outcomes a program can identify shortcomings and improve curricula and other activities (Nitko & Brookhart, 2007; Royse, Thyer, & Padgett, 2006). Because students in the QUEST program learn about quality management and process improvement, it is particularly appropriate that the program has a quality management system to guide its curriculum improvement. The results also help the program demonstrate its effectiveness to administrators and potential sponsors.

We recommend that a higher education program interested in improving its curriculum work to develop a data-driven, continuous improvement process as follows:

- Identify program learning outcomes and elements which define the skills that graduates should possess.
- Create rubrics for assessing performance on the elements of the learning outcomes.
- Identify course assignments and activities across the entire curriculum that are relevant to the elements of the learning outcomes.
- Appoint and train faculty, staff, students, alumni, and other interested parties to conduct evaluations.
- Complete assessments throughout the academic year and analyze the results without delay.
- Consider the results, identify opportunities for improvement, and initiate changes.
- Use the results of future assessments to verify whether the changes are having the desired impact.

Evaluating course assignments avoids requiring students to do more work. Using rubrics can improve the consistency of evaluations (Rhodes & Finley, 2013) and make it possible for students and other participants to perform some evaluations with minimal training on the LOA process, how to use the rubrics, and examples that illustrate the different levels of performance for the elements of the learning outcomes.

Future research on instructional design would be useful to identify and compare methods for designing a course to support program learning outcomes with detailed task-specific guides (Diefes-Dux, Hjalmarson, & Zawojewski, 2013). Successful examples of using assignment grades directly as program learning outcomes assessments and collecting portfolios of student work would be useful as well.

The assessment process used material from all three required courses and involved a variety of evaluators, including students, alumni, faculty, and staff. We have developed assessment techniques that can be enhanced and used again, and we have selected ways for analyzing and reporting the results. The process and assessment techniques described here should be useful to other METM programs and to engineering programs (including those that are not honors programs) that, like the QUEST program, help students learn to integrate knowledge and skills from multiple courses to solve real-world problems in multidisciplinary teams.

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Table 1: Learning Outcomes, Elements, Numbers of Evaluations, and Assessment Mechanisms

Learning Outcome	Element 1	Element 2	Element 3	Element 4	Number of Evaluations	Assessment Mechanisms
1. Apply quality management tools, improve processes, and design systems.	Tool selection	Fit	Tool use	Solution evaluation	32	IDQ: Final presentations; final paper QCIP: Faculty advisor evaluation; final presentation
2. Manage the new product development process and market a new product or technology working on a multidisciplinary team.	Problem identification	Ability to build the innovation	Significance of the innovation	Market definition	16	IDQ: Final presentations; final papers
3. Ability to use quantitative and qualitative data analysis techniques.	Qualitative analysis	Quantitative analysis	Multi-methods synthesis	Methodology	52	IDQ: Final presentations; final papers QCIP: Faculty advisor evaluations; final papers
4. Work in multidisciplinary teams to evaluate, analyze, and recommend solutions to real-world problems provided by corporate sponsors.	Problem identification	Methodology	Analysis	Recommendations	27	QCIP: Faculty advisor evaluations; final presentations
5. Work in multi-disciplinary teams with an understanding of different roles and how to negotiate conflict in these situations.	Role identification and delegation	Coordination of tasks	Conflict resolution	Coherence around mission	14	IDQ: Mentor evaluations QCIP: Faculty advisor evaluations
6. Communicate ideas effectively in business environments through written, visual, and oral methods.	Articulation	Enthusiasm	Clarity	Ability to convey difficult concepts	84	IDQ: Self evaluations QCIP: Final presentations; final papers
7. Manage projects and people using effective project management tools.	Parsing complex tasks	Project definition	Resource allocation	Risk management	25	IDQ: Mentor evaluations STMDM: Teaching assistant evaluations QCIP: Faculty advisor evaluations
8. Use business etiquette skills to network and communicate in diverse professional settings and behave in a professional and ethical manner.	Listening	Communication	Attire	Ethics	4	QCIP: Faculty advisor evaluations

Table 2: Rubrics for Elements of Learning Outcomes 1 to 8

Learning Outcome and Element Name	Advanced	Proficient	Developing	Unacceptable
1. Tool selection	Selects the most appropriate tool or approach for the problem situation after thorough consideration of alternatives.	Selects a tool or approach after considering some alternatives.	Selects a tool or approach without considering any alternatives.	Arbitrarily selects a tool or approach.
1. Fit	The selected tool or approach is the most appropriate one for the problem.	The selected tool or approach is appropriate for the problem; however, some of the tool's assumptions do not hold.	The selected tool or approach is relevant to the problem; however, other tools would have been a more natural fit; many of the selected tool's assumptions do not hold.	The selected tool or approach is inappropriate for the problem.
1. Tool use	The tool or approach was used appropriately, correctly, and effectively.	The tool or approach was used in a reasonable manner with few mistakes.	Some steps of the tool or approach were performed incorrectly or inappropriately.	The tool or approach was used inappropriately, incorrectly, and ineffectively.
1. Solution evaluation	The proposed solution was evaluated correctly on all relevant criteria.	The proposed solution was evaluated correctly using some relevant criteria.	The proposed solution was evaluated appropriately but incorrectly.	The proposed solution was not evaluated or was evaluated using inappropriate criteria.
2. Identification of the problem that the innovation is solving	Clearly defines problem; does not assume the source of the problem; able to articulate and consider the problem from multiple disciplines and perspectives; able to understand the root causes of the problem.	Defines problem; does not assume the source of the problem; mostly able to articulate and consider the problem from multiple disciplines and perspectives; mostly able to understand the root causes of the problem.	Problem definition is unclear; assumes the source of the problem; unable to consider the problem from multiple disciplines and perspectives; able to understand some root causes of the problem.	No problem definition or evidence of considering problem source or root causes.
2. Ability to build the innovation	Demonstrates a prototype that accurately reflects the innovation.	Demonstrates a prototype that mostly reflects most elements of the innovation.	Demonstrates a prototype that reflects some elements of the innovation; however, prototype is not entirely clear.	No demonstration of a prototype.
2. Significance of the innovation	The innovation is novel and demonstrates unique and distinguishing features.	The innovation has many distinguishing features but is similar to previous innovations.	The innovation has some unique features but is closely related to previous innovations.	The innovation is indistinguishable from other products.
2. Market definition	Clearly defines the market in which the product will be diffused including a quantification of the size of the market and how customers in this market demand the product.	Mostly defines the market including a discussion of potential customers.	Loosely defines the market but does not discuss potential customers.	Does not define the market or potential customers.

Table 2: Rubrics for Elements of Learning Outcomes 1 to 8 (Continued)

3. Qualitative data analysis	Synthesizes data from interviews, observations, focus groups, or other appropriate qualitative techniques to accurately analyze the problem.	Uses interviews, observations, focus groups, or other appropriate qualitative techniques to generally analyze the problem.	Demonstrates limited ability to use interviews, observations, focus groups, or other qualitative techniques.	Does not employ qualitative data analysis techniques.
3. Quantitative data analysis	Evaluates several sources of quantitative data and synthesizes information from quantitative data using sophisticated statistical analysis to provide recommendations to the problem.	Evaluates some sources of quantitative data and synthesizes information from quantitative data using basic statistical analysis to provide recommendations to the problem.	Evaluates a limited number of sources of quantitative data and synthesizes some information from quantitative data using elementary statistical analysis.	Does not employ quantitative data analysis techniques.
3. Multi-methods synthesis	Synthesizes qualitative and quantitative research techniques to develop a more detailed insight into the problem; use of multi-methods strengthens analysis.	Synthesizes most qualitative and quantitative research techniques; use of multi-methods complements analysis.	Synthesizes a few qualitative and quantitative research techniques; unclear how use of multi-methods benefits analysis.	Does not provide a synthesis of qualitative and quantitative analyses.
3. Methodology choice	Appropriate choice of methodology to evaluate the problem; proper application of methodology; methodological assumptions conform to the context of the problem.	Methodology is adequate to address the problem; mostly appropriate application of methodology; some methodological assumptions conform to the context of the problem.	Methodology is not appropriate to address the problem; methodological assumptions do not conform to the context of the problem.	No discussion of methodology.
4. Problem identification	Fully considers client needs in identifying a significant organizational problem.	Considers most client needs in identifying a somewhat significant organizational problem.	Considers some client needs in identifying an organizational problem with limited significance.	Does not consider client needs; identified problem is not significant to organization.
4. Methodology	Properly identifies and applies the most appropriate methodology to address the problem or opportunity.	Identifies and applies a usable methodology to address the problem or opportunity.	Addresses some aspects of the problem or opportunity; however, the methodology is not fully appropriate for this project.	The methodology applied is not appropriate to address the problem or opportunity.
4. Analysis	Fully analyzes several sources of data including quantitative and qualitative measures in an objective way.	Analyzes quantitative and qualitative data in an objective way; analysis could be more in-depth.	Analyzes a limited amount of data; insufficient use of either quantitative or qualitative data; analysis is somewhat objective.	Analysis is unclear or subjective.

Table 2: Rubrics for Elements of Learning Outcomes 1 to 8 (Continued)

4. Recommendations	Prioritizes and precisely defines and justifies feasible and desirable recommendations that are actionable by a client.	Prioritizes and generally defines and justifies mostly feasible and desirable recommendations that may be actionable by a client.	Loosely defines somewhat feasible recommendations that may be actionable by a client.	Provides weak recommendations that are unlikely to be actionable by a client.
5. Role identification and delegation	Team clearly defines their roles; these roles are interdependent but not overlapping or redundant; team members are accountable for the completion of all team tasks.	Team mostly defines roles; roles have some interdependence but some overlap and redundancies; team members are accountable for the completion of tasks within their individual roles.	Team defines some of their roles; roles are not interdependent and overlap and redundancies are present; team members are somewhat accountable for the completion of tasks within their individual roles.	Team does not define roles and is not accountable.
5. Coordination of tasks	Tasks are well documented and clear interfaces are used for the successful transfer of information between team members.	Tasks are generally well documented and reasonably clear interfaces are used to transfer information between team members.	Tasks are documented; however, documentation could be clearer; information transfer between team members is poorly structured.	Tasks are not documented; information transfer has no coordination.
5. Conflict resolution	Team is able to identify and address conflict in a timely manner; team develops appropriate methods to resolve conflict.	Team is able to identify and address conflict; however, conflict remains unresolved.	Team is able to identify conflict but is unable to appropriately address or resolve the conflict.	Team has conflict but is unable to identify, address, or resolve the conflict.
5. Coherence around common mission	Clear and consistent definition of a common mission or objective by all team members; commitment by team members to help accomplish this shared goal.	Mostly clear definition of team's mission with consistency from most team members; commitment by most team members to accomplish this shared goal.	Vague definition of team's mission with inconsistent views amongst team members; varying levels of commitment to mission within team.	Team does not have a common mission or objective.
6. Articulation	Team members clearly articulate thoughts and ideas with no spelling, grammatical, or language issues.	Team members articulate thoughts and ideas with limited spelling, grammatical, or language issues.	Team members articulate thoughts and ideas; however, spelling, grammatical, and language issues are frequent.	Spelling, grammatical and language issues are a severe detriment to team's presentation.
6. Enthusiasm	The team consistently communicates all concepts in a way that presents their ideas in a positive light and conveys enthusiasm.	The team generally communicates in a positive manner which presents the project in a positive light and conveys enthusiasm; however, enthusiasm wanes at some points during presentation.	The team shows some level of enthusiasm; however, communication conveys some degree of frustration or boredom with the project.	The team is not enthusiastic and appears to be frustrated and/ or bored with the project.

Table 2: Rubrics for Elements of Learning Outcomes 1 to 8 (Continued)

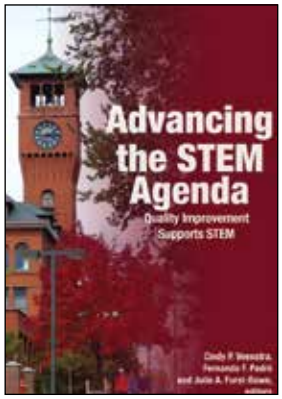
6. Clarity	Communication is concise and direct, and the logic of the presentation is straightforward.	For the most part, communication is concise and direct and the logic of the presentation is relatively easy to follow.	Communication varies between direct and concise and difficult to follow.	Communication is overly abrupt or long-winded; the logic of the presentation is difficult to follow.
6. Ability to convey difficult concepts	The team clearly communicates difficult-to-understand concepts and specialized knowledge such that a diverse audience may easily understand the project and its results.	The team communicates difficult-to-understand concepts and specialized knowledge such that a diverse audience understands most elements of the project and its results.	The team is able to convey some technical concepts to a diverse audience; however, many concepts may be unclear to those without specialized knowledge.	The team does not attempt to, or succeed in, conveying difficult technical concepts to a diverse audience.
7. Parsing complex tasks	The team fully understands a complex task, divides it into appropriate subtasks, orders the subtasks logically, and correctly identifies dependencies.	The team understands most elements of a complex task, divides it into appropriate subtasks, orders most of the subtasks logically, and correctly identifies most of the dependencies.	The team fully understands some components of a complex task, divides it into some subtasks, orders some of the subtasks logically, and identifies some dependencies.	The team demonstrates minimal understanding of a complex task and does not develop appropriate subtasks.
7. Project definition	The team precisely defines the project scope and develops clear definitions of project success.	The team generally defines the project scope and develops appropriate definitions of project success.	The team defines some of the project scope and develops vague definitions of project success.	The team does not define the project scope and does not develop definitions of project success.
7. Project resource allocation	The team allocates its resources optimally and identifies and thoroughly learns all of the skills that it needs but does not have.	The team allocates its resources efficiently and identifies and learns most of the skills that it needs but does not have.	The team allocates its resources inefficiently and identifies and attempts to learn some of the skills that it needs but does not have.	The team allocates its resources ineffectively and does not attempt to learn any of the skills that it needs but does not have.
7. Risk management	The team anticipates all project risks, develops effective risk mitigation plans, and successfully implements their strategy.	The team anticipates most of the project risks, develops appropriate risk mitigation plans, and implements most of their strategy.	The team anticipates some of the project risks, develops some risk mitigation plans, and successfully implements some of their strategy.	The team does not anticipate project risks and does not develop risk mitigation plans.
8. Listening	Listens to verbal and visual communication to fully understand a message and reflect the message back to the speaker with 100% agreement.	Listens to verbal and visual communication to mostly comprehend a message; is able to reflect the message back to the speaker with general agreement.	Listens to verbal and visual communication to comprehend some elements of a message; attempts to reflect the message back to the speaker with some difficulty.	Does not listen to verbal or visual communication to sufficiently understand most messages; does not attempt to reflect messages back to speaker.

Table 2: Rubrics for Elements of Learning Outcomes 1 to 8 (Continued)

8. Communication	Verbal and non-verbal communication skills in one-on-one, group, and professional settings demonstrate respect for an audience and convey content so that the audience may fully understand the message.	Verbal and non-verbal communication skills in one-on-one, group, and professional settings mostly demonstrate respect for an audience; content is conveyed so that the audience understands the main points of the message.	Verbal and non-verbal communication skills in one-on-one, group, and professional settings demonstrate some respect for an audience; content is conveyed so that the audience understands some of the main points of the message.	Verbal and non-verbal communication skills in one-on-one, group, and professional settings do not demonstrate respect for an audience and do not convey content so that the audience may understand the message.
8. Attire	Personal appearance is appropriate for the setting and demonstrates care and respect for others.	Personal appearance is mostly appropriate for the setting and demonstrates respect for others.	Personal appearance is somewhat appropriate for the setting and demonstrates consideration of others.	Personal appearance is inappropriate for the setting.
8. Ethics	Ability to fully recognize ethical issues; clear understanding of one's personal ethics and values; clear ability to act on ethical principles.	Ability to recognize most ethical issues; general understanding of one's personal ethics and values; ability to act on ethical principles in most situations.	Ability to recognize some, but not all, ethical issues; some understanding of one's personal ethics and values; ability to act on ethical principles in some situations.	Unable to recognize most ethical issues; limited understanding of one's personal ethics and values; unable to act on ethical principles in most situations.

Education Division's *Advancing the STEM Agenda Book*

A collection of conference papers from the 2011 Advancing the STEM Agenda Conference. Available through ASQ Quality Press.



This publication is full of collaborative models, best practices, and advice for teachers, higher education faculty, and human resources personnel on improving the student retention (and thereby increasing the supply of STEM workers). Ideas that will work for both STEM and non-STEM fields are presented. The introduction maps out the current landscape of STEM education and compares the United States to other countries. The last chapter is the conference chairs' summary of what was learned from the conference and working with 36 authors to develop this book. This effort is part of a grassroots effort among educators to help more students be successful in STEM majors and careers.

"Veenstra, Padró, and Furst-Bowe provide a huge contribution to the field of STEM education. We all know the statistics and of the huge need in the area of STEM students and education, but what has been missing are application and success stories backed by research and modeling. The editors have successfully contributed to our need by focusing on collaborative models, building the K-12 pipeline, showing what works at the collegiate level, connecting across gender issues, and illustrating workforce and innovative ideas."

John J. Jasinski, Ph.D.
President, Northwest Missouri State University

"*Advancing the STEM Agenda* provides a broad set of current perspectives that will contribute in many ways to advancing the understanding and enhancement of education in science, education, and engineering. This work is packed with insights from experienced educators from K-12, regional, and research university perspectives and bridges the transition from education to workplace."

John Dew, Ed.D.
Senior Vice Chancellor, Troy University

Quality Approaches in Higher Education

Understanding students' changing needs by determining how students' satisfaction changes as they progress through the curriculum.

Graduate Marketing Students' Satisfaction in the Caribbean: A Longitudinal Case Study

Nazareen Muhammad, Raghava Rao Gundala, Mandeep Singh, and Jessica Harriger

Abstract

Domestic and international competition has increased pressure on business schools to provide consistent quality service to keep existing students, as well as to recruit new students. Therefore, higher education providers must be aware of students' expectations and implement strategies to meet and exceed these expectations. This research study seeks to determine the satisfaction levels of master's of marketing students in a Caribbean business school through the duration of their program of study. Several statistical techniques were used in the study. The study found that while overall student satisfaction decreases over time, the factors that contribute to satisfaction change as the students' progress through the curriculum. The results of this study will help business schools in understanding the changing needs of students at each stage in the educational process.

Keywords

Business Schools, Education, Student Satisfaction, Gap Analysis, Competitive Advantage

Introduction

Higher education environments have become increasingly competitive (Maringe, 2006); therefore, the key to competitive advantage lies in delivering high-quality service that will result in satisfied customers (Shemwell, Yavas, & Bilgin, 1998). Service quality is "regarded as a driver of corporate marketing and financial performance" (Buttle, 1996). It is also a critical determinant of competitiveness (Lewis, 1989), a source of lasting competitive advantage, and service differentiation (Moore, 1987). Further, service quality affects the repurchase intents of customers (Ghobadian, Speller, & Jones, 1994).

Intensive competition (Ford, Joseph, & Joseph, 1999), internalization, higher expectations (Marzo-Navarro, Redraja-Iglesias, & Rivera-Torres, 2005), more full-fee-payment students (Oldfield & Baron, 2000), and recognition of education as a marketable service (Cuthbert, 1996; Mazarrol, 1998), have compelled educational institutions to pay closer attention to assessing the overall perceived service quality. Hill (1995) suggests that greater efforts should be made to understand the needs of students throughout their time in school. This study tries to determine the levels of student satisfaction over time for those pursuing master's of marketing (MM) degrees. The study identifies components of the service delivery process and determines the factors that are most important in the educational service consumption.

Service Quality Versus Customer Satisfaction

Service quality is "the totality of features and characteristics of a product or service that bears on its ability to satisfy stated or implied needs" (Johnson & Winchell, 1988). On the other hand, customer satisfaction represents the difference between consumers' prior expectations and their perception on purchase outcomes (Yi, 1990). An experience that surpasses customers' expectations increases the propensity to build loyalty. While the terms quality and satisfaction appear similar, researchers have found differences when comparing the two.

While there is a lack of consensus about the specifics of the service quality—satisfaction relationship—the dominant conceptualization suggests service quality is an antecedent of the superordinate satisfaction construct. A study conducted by Brady, Cronin, and Brand

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(2002) supports the conceptualization of service quality as an antecedent to customer satisfaction. Further, consumer satisfaction is found to be the superordinate construct based on its ability to explain a greater portion of the variance in consumers' purchase intentions.

Iacobucci and Ostrom (1995) find no difference between perceived quality and customer satisfaction on kept promises, customization, friendliness, or purchase intentions. Their results support the quality and satisfaction literature, as they find that it is the relative judgment of experiences versus expectations that influence purchase intentions. They, therefore, find several distinctions between service quality and customer satisfaction. Service quality is influenced by the purchase attributes of the price, background operations, and expertise. However, customer satisfaction is influenced by service timeliness, recovery, and physical environment.

The causal order of the relationship between service quality and customer satisfaction has been widely debated. Cronin and Taylor (1992) found that service quality is an antecedent to customer satisfaction. Alternatively, some researchers argue that satisfaction precedes service quality (Oliver, 1980). The third conceptualization of the service quality—satisfaction relationship—suggests that satisfaction and service quality are simultaneously determined (Dabholkar & Thorpe, 1994).

Failure to understand and deliver services in keeping with customers' expectations leads to reduced satisfaction, negative word-of-mouth, and eventually a decline in revenue and market share (Horovitz, 1990). High-quality service delivery leads to positive lasting effects on both the student population and the institution. Therefore, a business school must continually review and improve its offerings to remain competitive.

To maintain service quality, business schools need to understand the factors that drive customer satisfaction. One approach to service quality management is to align institutional priorities with market and student expectations (Hill, 1995). It is, therefore, important that schools gather and disseminate information about their students' changing needs and tailor processes to meet these needs through the duration of the study. Further, business schools should take appropriate steps to manage students' expectations proactively (Berry, Zeithaml, & Parasuraman, 1985). Aiello, Czepiel, and Rosenberg (1977) find the gap between actual experiences and client expectations determines consumer satisfaction or dissatisfaction. The study examines the differences between student expectations and their realized experiences.

Parasuraman, Zeithaml, and Berry (1986) distinguish between service quality and satisfaction. Service quality represents a global judgment or attitude, related to excellence of the service while satisfaction relates to a particular transaction. The two are related since over time the incidents of satisfaction result in customers' perceptions of quality (Oliver, 1981). Therefore, the satisfaction soon transcends their attitudes toward the quality of services. Since students attend classes regularly over many years and, therefore, have many data points with professional service providers (institutional interactions), student satisfaction is treated as a proxy for their evaluation of service quality.

In an exploratory study of service quality in a business educational setting, LeBlank and Nguyen (1997) identify seven service quality factors as critical to business schools: contact with faculty, school reputation, physical environment, contact with administration, curriculum, school responsiveness, and access to facilities. Swartz and Brown (1989) contend the delivery of a professional service is interactive. Since professionals need advanced degrees in higher education, investigators must examine the perceptions of both parties (professional and student).

This research attempts to examine which of the service quality constructs are most important in delivering service quality, while also defining the constructs with the greatest room for improvement. The service quality gaps identified should inform future service development and represent the basis of continuing monitoring and improvement.

Method

Seventy marketing students were surveyed at different stages in the MM program. Students were classified based on the number of months in the program—those with less than eight months as the beginning stage, nine to 12 months of study as a middle stage, and more than 12 months as the end stage. The survey used the seven service factors identified by LeBlanc and Nguyen (1997). The questionnaire contained 40 variables related to different aspects of the business school's offerings, such as the faculty's expertise, school's image, available facilities, program offerings, as well as the administration's responsiveness. The questionnaire also used items that corresponded to the five dimensions on the SERVQUAL scale of quality as developed by Parasuraman, Zeithaml, and Berry (1988, 1991). The items on the satisfaction side of the survey were measured on a seven-point Likert scale, which ranged from 1 (totally dissatisfied) to 7 (totally satisfied) with unlabeled midpoints. A similar scale was used for perceived importance dimension, although, for these questions, 1 represented "not at all important" and 7 indicated the factor was "very important" to the student.

As in the case with LeBlanc and Nguyen, it is hypothesized that student satisfaction is a function of school reputation, contact with faculty, physical environment, contact with administration, curriculum, responsiveness, and access to facilities. The survey instrument consisted of two parts. Section one focused on

the students' responses to each of the seven variables to ascertain students' satisfaction levels and the importance of the constructs to them. The expectations and perceptions were captured in a single measure of perception-expectation differences, consistent with the approach suggested by Carman (1990). The second part focused on respondent demographics. A breakdown of the survey population is provided in Table 1. For student convenience, all questionnaires were administered in person, on campus, at a scheduled time between September and November 2011. Of the 63 respondents who completed the entire questionnaire, 71% of the respondents were between the ages of 21 and 29, and female respondents outnumbered the males.

Table 1: Respondent Attributes. Of the 70 respondents, only 63 students completed both part one and part two of the survey

	Number of Respondents	Percent of Sample
Age of Respondent		
21-24 years	14	22%
25-29 years	31	49%
30-34 years	4	6%
35-39 years	31	8%
40-44 years	3	5%
45-49	4	6%
50 and over	2	1%
Gender		
Male	19	30%
Female	44	70%
Highest Qualification Upon Program Entry		
Postgraduate award	5	5%
Degree or equivalent	54	84%
Professional qualification	5	8%
Other	2	3%

Analysis and Results

Factor Analysis Results

Several statistical methods were used to analyze the survey data. To reduce the survey data into critical factors, an exploratory factor analysis with varimax rotation was used. This technique yielded 35 items over seven factors. Following Tabachnick and Fidell (1989), some variables included in the factor, based on factor loadings greater than 0.75 and eigenvalues greater than one. To assess the reliability of measures, Cronbach's alpha is calculated for the variables retained for each factor and coefficients greater than or equal to 0.70 are considered a good indication of construct reliability (Nunnally, 1978).

Under these guidelines, seven variables were removed over four of the factors. Factor 1, contact with faculty, consists of five items related to the performance of the faculty members and their ability to inspire trust and confidence. Reputation, factor 2, relates to the business school's ability to position itself in the minds of its customers and is, therefore, closely associated with the image projected by the organization. This factor was only reduced by one variable. Factor 3, physical environment, maintains four variables that describe the tangible cues associated with the business school's service delivery system and its facilities. Factors 4 and 5 kept all of their original variables in the analysis. Factor 4 represents contact with administration and concerns the dimensions linked to management's ability to provide personal attention to students in a professional and caring manner. Factor 5, the curriculum, is related to management and faculty's capacity to plan and deliver learning experiences that meet student needs. Factor 6, responsiveness, measures the school's ability to provide service in a prompt and timely manner. All variables were retained in factor 7, student access to facilities, which considers the accessibility and availability of convenient, comfortable, and equipped spaces for study, parking, research, and learning. Overall after the analysis, factor loadings on the variables retained ranged from 0.71 to 0.92. A breakdown of the variables maintained in each factor grouping is provided in Table 2.

Stepwise Regression Results

After establishing seven primary factors, a backward elimination was conducted by stepwise regression of overall student satisfaction. It was determined the model was statistically significant (F-value = 0.000) and accounted for 49.8% of the variance in overall satisfaction. A closer examination of the model revealed that school reputation alone accounts for 30.5% (p-value = .000) of the variance in overall satisfaction. When reputation and responsiveness were included in the model together, the variance accounted for is 35.7% (p-value = 0.016). When only reputation was excluded, the other significant factors were responsiveness (p-value = 0.016), curriculum (p-value = 0.022), and personal contact with faculty (p-value = 0.033). Table 3 provides a breakdown of the factor correlations for the 66 valid observations of the regression. P-values following a 1-tailed sigma test are reported in parentheses. Factor 1 represents contact with faculty, factor 2 school reputation, factor 3 physical environment, factor 4 contact with administration, factor 5 curriculum, factor 6 responsiveness, and factor 7 represents access to facilities.

Means Testing Results

To observe the gaps between students' expectations and satisfaction a series of t-tests were conducted in which the null hypothesis was that the students' expectations match their satisfaction. The t-tests yielded significance on all seven factors, allowing the rejection of the null hypothesis and showing a significant relationship between satisfaction levels and expectations on all service quality dimensions (Table 4) at the 10% significance level. While all mean scores on the satisfaction dimensions ranged from neutral to very satisfied (4.15 to 5.91 on the survey), the expectations (importance) dimension superseded these ratings on all factors. On every factor, respondents rated the importance from 6.10 to 6.41.

Table 2: Variables Retained Following Factor Analysis

Factor Name	Variables	Factor Loading	Percent of Variance Explained	Cronbach's Reliability Coefficient
1. Contact personnel faculty	• Teaching ability of faculty • Professors are friendly and courteous • Knowledge and skills base of faculty • Appearance of professors • Helpfulness of teaching staff	0.85 0.79 0.77 0.75 0.72	60.7	0.83
2. Reputation	• Organizational culture, beliefs, and values • Administration has students' best interest at heart • Business school is innovative • Business school's involvement in community	0.92 0.79 0.78 0.77	66.8	0.82
3. Physical evidence	• Degree to which classrooms and study rooms are comfortable • Décor and atmosphere • Overall cleanliness • Layout of classroom	0.88 0.84 0.75 0.73	64.3	0.82
4. Contact personnel administration	• Capacity to solve problems when they arise • Availability of personnel • Personnel has a good knowledge of rules and procedures • Friendly and courteous personnel • Appearance of personnel	0.88 0.86 0.84 0.79 0.78	68.7	0.88
5. Curriculum	• Degree to which objectives of programs are explained • Orientation of programs and course content • Number of courses offered	0.86 0.80 0.79	66.8	0.75
6. Responsiveness	• Timely feedback on examination results • Class schedule received at least one month in advance • Orientation covers concerns and expectations • Records are kept accurately • Registration is timely and error free • Students are informed promptly of changes	0.81 0.78 0.76 0.76 0.74 0.72	58.1	0.85
7. Access to facilities	• Restaurant availability • Efficiency of IT staff • Access to computer facilities • Access to study rooms • Availability of parking	0.84 0.83 0.81 0.79 0.71	63.6	0.85

Table 3: Factor Pearson Correlations

	Overall Satisfaction	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Overall Satisfaction	1.000	0.428	0.562	0.225	0.316	0.507	0.519	0.419
		(0.000)	(0.000)	(0.035)	(0.005)	(0.000)	(0.000)	(0.000)
Factor 1	0.428	1.000	0.406	0.283	0.367	0.435	0.373	0.265
	(0.000)		(0.000)	(0.011)	(0.001)	(0.000)	(0.001)	(0.016)
Factor 2	0.562	0.406	1.000	0.330	0.497	0.555	0.559	0.476
	(0.000)	(0.000)		(0.003)	(0.000)	(0.000)	(0.000)	(0.000)
Factor 3	0.225	0.283	0.330	1.000	0.331	0.315	0.567	0.417
	(0.035)	(0.011)	(0.003)		(0.003)	(0.005)	(0.000)	(0.000)
Factor 4	0.316	0.367	0.497	0.331	1.000	0.342	0.466	0.278
	(0.005)	(0.001)	(0.000)	(0.003)		(0.002)	(0.000)	(0.012)
Factor 5	0.507	0.435	0.555	0.315	0.342	1.000	0.590	0.432
	(0.000)	(0.000)	(0.000)	(0.005)	(0.002)		(0.000)	(0.000)
Factor 6	0.519	0.373	0.559	0.567	0.466	0.590	1.000	0.602
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)
Factor 7	0.419	0.265	0.476	0.417	0.278	0.432	0.602	1.000
	(0.000)	(0.016)	(0.000)	(0.000)	(0.012)	(0.000)	(0.000)	

Table 4: Factor Means and Paired Differences Between Dimensions

Factor Number	Factor	Satisfaction Mean Score	Importance Mean Score	Paired Difference
1	Contact personnel faculty	5.81	6.27	-0.461
2	Reputation	4.69	6.10	-1.41
3	Physical evidence	5.77	6.30	-0.493
4	Contact personnel administration	5.40	6.36	-0.971
5	Curriculum	5.19	6.41	-1.22
6	Responsiveness	4.83	6.41	-1.66
7	Access to facilities	4.15	6.39	-2.25

Students reported the widest gaps in perceived satisfaction and importance on access to facilities, responsiveness, and reputation. The gaps ranged from -2.25 to 1.41 on these three factors, while the narrowest gaps were on contact with faculty and physical environment: -0.461 and -0.493.

Overall, the MM students' perceived satisfaction levels were lower than their expectations on each factor. Despite this failure to meet student expectations, the findings infer the service quality delivered was good, as none of the mean ratings fell in the dissatisfied range, which is 1 to 3 on the survey. This information is critical as delivering quality service means conforming to customer expectations on a consistent basis (Lewis & Booms, 1983).

ANOVA Results

Student Satisfaction

To determine the variations in satisfaction levels across time, as well as the changes in perceived importance for each factor, a univariate analysis of variance on each factor

for each phase was conducted. This provided both a regression analysis and a variance analysis for one dependent variable (satisfaction) by one or more factor and/or variable. Given the boundaries of this study, the ANOVA method was suitable for these purposes. The sample was balanced, and there was no reason to disregard the statistical assumptions (homogeneity in variance, normally distributed errors, and independent observations) in the model. As this study explored student satisfaction across three different time periods, the ANOVA means testing was preferable over a simple t-test. Although there are more sophisticated methods of analysis, such as nonparametric tests like the Kruskal-Wallis test, the ANOVA remains the most robust and powerful.

The results in Table 5 show a significant difference in student satisfaction with faculty contact over time. The ANOVA results indicated there are differences in student satisfaction. However, the ANOVA is only able to suggest that a difference exists. To prove the comparisons between groups, the Bonferroni Post Hoc test was used. This testing method is believed to be the most conservative post-hoc test and, therefore, the most likely to rule out "false rejections." Since the study focused on three time periods, the Bonferroni Post Hoc test reduced to a simple t-test, in which the null hypothesis assumed there were no differences between the time periods. For at least a 10% level, it was found the students' satisfaction was significantly higher at the start of the program. It determined reputation declined significantly over time (at least a 10% significance level). The scores for reputation began at 5.22 and then fell to 5.04 (mid stage) and lastly to 4.02 (end stage). This change represented a 23% decline in satisfaction with the school's reputation. No significant difference was found in perceived satisfaction levels on the factors of physical environment and contact with administration. For overall satisfaction, significant variations were found between the start and end phases of the program. The overall satisfaction means ranged from 5.52 (very satisfied) at the starting stage to 5.42 (satisfied) at the mid stage, and then to 4.26 (neutral) at the end stage. Overall satisfaction levels decreased by 22.8% from the beginning to the end stage.

Table 5: Means Test for Student Satisfaction

Factor	Beginning	Midpoint	End	F-value	P-value
Contact with faculty	6.23	5.72	5.53	5.72	0.005
Reputation	5.22	5.04	4.02	8.09	0.001
Physical environment	6.02	5.68	5.63	1.10	0.342
Contact with administration	5.78	5.16	5.23	2.30	0.108
Curriculum	5.81	5.12	4.74	6.42	0.003
Responsiveness	5.31	4.74	4.50	3.30	0.043
Access to facilities	4.67	4.45	3.52	9.63	0.006
Overall satisfaction	5.52	5.42	4.26	10.14	0.000

Table 6: Perceived Factor Importance

Factor	Beginning	Midpoint	End	P-value
Contact with faculty	6.17	6.24	6.36	0.584
Reputation	5.99	5.78	6.40	0.050
Physical environment	6.35	5.83	6.48	0.026
Contact with administration	6.48	6.13	6.43	0.151
Curriculum	6.49	6.04	6.60	0.017
Responsiveness	6.55	6.08	6.72	0.004
Access to facilities	6.39	6.15	6.56	0.131
Overall satisfaction	5.52	5.42	4.26	10.14

Perceived Factor Importance

On the importance, the ANOVA test showed significant differences between groups on five of the seven factors at the 5% significance level, as shown in Table 6. Responsiveness had the most significant variations between groups, followed by curriculum. Significant variations were found in the importance for the physical environment and the school's reputation. Surprisingly, no significant variations were found for access to facilities and contact with administration and faculty. In the beginning stages of the program, students' importance ratings on all factors ranged from 5.99 (important) to 6.55 (very important). In this phase the most important factors were responsiveness, curriculum, and contact with administration. On the other hand, reputation, contact with faculty, and the physical environment were the least important.

Discussion and Conclusions

Educators have a unique task in providing service quality given the duration of service and its interactive nature. Delivering satisfaction is driven by service quality that meets or exceeds student expectations throughout the duration of their study. The gap analysis clearly shows room for improvement on all constructs. Service quality gap scores were negative in all dimensions of service, with high perception scores in all areas matched with even higher expectations. The paired differences ranged from -2.25 to -0.461. The areas of concern included: access to facilities, responsiveness, school's reputation, and curriculum.

Looking at the gaps over time, it was found that in the early stages efforts should be focused on improving service quality in responsiveness. Further, it was found that new students need timely and accurate information to understand their progress in the program. Students need a practical orientation to the objectives behind the curriculum. Management should spend time with new students addressing questions on the curriculum. Active contact with administration is necessary to help new students navigate the program successfully and bring relief to the problems associated with the introduction to a new environment.

At the midpoint of the program, the gaps between perceived importance and satisfaction improved. On faculty contact, the average satisfaction exceeds the perceived importance. However, urgent work is still needed to improve access to facilities as it falls short. Students clearly value personal contact with faculty and administrators and easy access to facilities. At this point students have a clearer understanding of class scheduling and examination timetables and are now more interested in faculty feedback on their performance. They expect appropriate study spaces with access to current technology. Also, they expect minimal bureaucracies such as unnecessary paperwork and delays in registration.

As students approach the end of the program, they are interested in the overall quality of the education and relevance to the real world. As Figure 1 shows, there is a significant disconnect in understanding student priorities and resulting satisfaction. This is consistent with the findings of Hall, Swart, and Duncan (2012). There is much room for improvement in bridging this gap. This becomes critical from the institutional vantage point as these students are the best representatives of the institution's product in the market area. Further, they can be a vital source for recruitment leads, internship/placement opportunities, and institutional fundraising endeavors. In an environment of shrinking resources, alumni are being successfully tapped to participate in an expanded range of initiatives.

From an organizational perspective, monitoring and delivering on student expectations becomes a high priority as competition for student enrollment continues to increase. Organizational reputation, access, and facilities will continue to be evaluated and reported in the popular press on a competitive basis. This task becomes especially onerous in an environment where student expectations are continually growing and access to information is increasingly instantaneous. The significance of institutional reputation and transparency take on added importance in this environment.

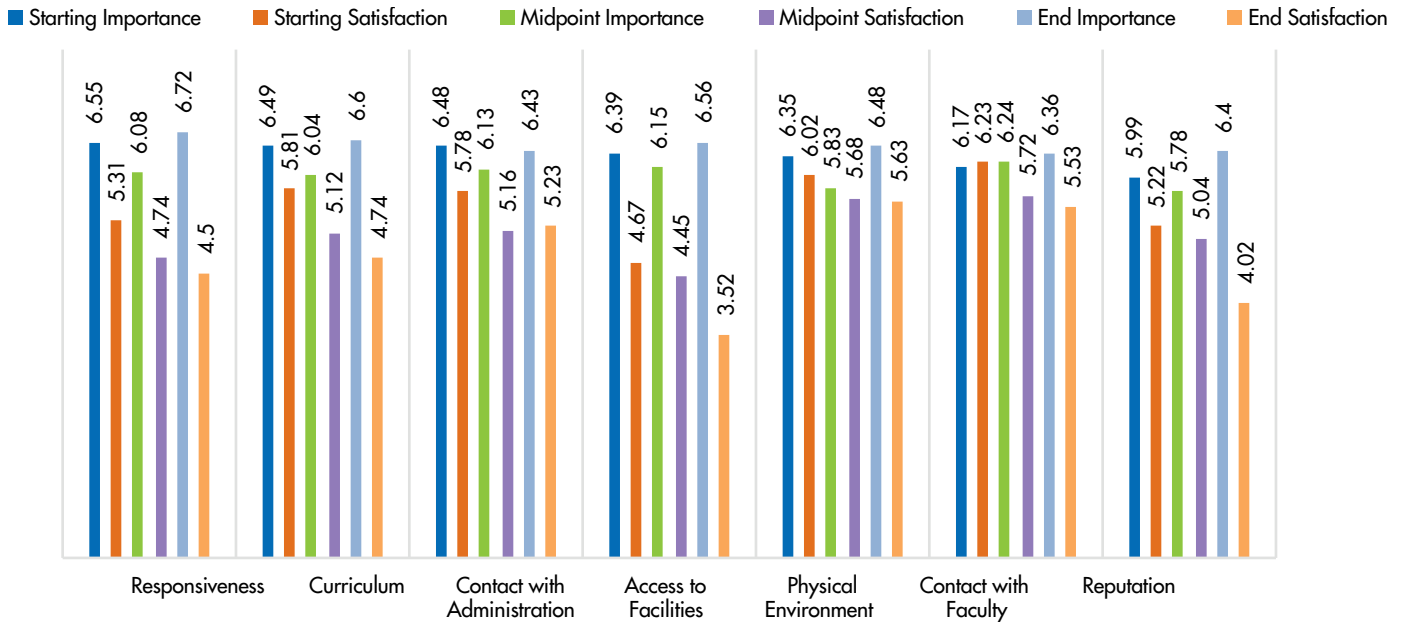

Figure 1: Perceived Importance Compared to Satisfaction

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Quality Approaches in Higher Education

Understanding student perceptions of design quality of face-to-face and online courses.

Closing the Feedback Loop: Hearing the Student Voice in Course Quality

Emily Hixon, Janet Buckenmeyer, and Casimir Barczyk

Abstract

One hundred eighty-three students from a Midwestern public university were surveyed to determine their perceptions of the design quality of their courses using items from the Quality Matters (QM) framework. The respondents rated the extent to which each of the 68 QM-based items was generally important in their courses. The data revealed that students perceived the design quality of their face-to-face and online courses similarly. This finding extends the generalizability of prior QM research, which focused solely on the perceptions of students assessing online offerings. The data also revealed how students ranked the quality dimensions associated with the QM framework. Areas where students' perceptions of course quality differed from the framework are summarized. Implications for instructional design and course facilitation are addressed.

Keywords

Educational Quality, Teaching Quality, Online Classes, Assessment/Surveys

Introduction

This study measured the perceptions of students on the design quality of their courses. It used the eight general standards that define quality expectations in the Quality Matters Rubric. Quality Matters (QM) is a continuous improvement program available to higher education institutions to assure the design quality of their online and blended courses. Since its inception, leaders of the QM program began sponsoring research focused on the impact of QM—both its rubric and its review process, which involves analyzing the design of a peer's course and providing recommendations for improvement of that course's design. The review process culminates in a determination as to whether the course design meets the thresholds established for quality (Shattuck, Zimmerman, & Adair, 2014).

This study extended the work of Ralston-Berg (2014) who asked whether "students agree that items presented in the QM Rubric indicate quality?" Understanding how students perceive course experiences can provide suggestions for instructors on how to promote improved learning outcomes (Rodriguez, Ooms, & Montanez, 2008). This is important for faculty interested in presenting high-quality online as well as face-to-face courses. It is even more important for university administrators who recognize the need to deliver quality instruction to students who have choices in today's highly competitive educational market. Astani, Ready, and Duplaga (2010) reported that higher education institutions are increasingly considering the addition of online course offerings as part of their strategic planning process. They also reported that students in their study believed that the quality of online courses was as good as face-to-face courses. The active involvement of students in the learning process coupled with opportunities for online teamwork, an activity particularly important in today's virtual work environment, provided for increased student satisfaction. This was the much sought-after outcome associated with quality course design.

Ralston-Berg's (2014) work used the QM criteria to examine students' perceptions of quality in online courses. This study extended her work by examining how students rate the QM criteria for courses in general. Further, it aimed to determine whether the differences between students' perceptions of what is valued in a course and QM's ratings for what

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is considered a quality-oriented course are practically significant. Understanding these differences has the potential to help institutions of higher learning with the development and promotion of quality course offerings.

Literature Review

Over the past decade, the number of students taking online courses has risen dramatically. In their annual report that tracks online education in the United States, Allen and Seaman (2014) noted that in 2013, the number of additional students taking an online course continued to grow at a rate far in excess of overall enrollment with 7.1 million students taking at least one online course. In other terms, about one-third of all eligible course enrollment is online.

With the rise in the acceptance of online education comes the concern of student retention in course offerings at a distance. In a national survey of more than 10,000 faculty members, 70% of respondents indicated the learning outcomes for online courses were inferior to or somewhat inferior to the learning outcomes for face-to-face instruction (Seaman, 2009). However, a meta-analysis conducted by the U.S. Department of Education (USDOE, 2010) found that online students performed "moderately better on average" compared to their traditional face-to-face counterparts and differences in implementation of online courses did not affect learning outcomes. It is important to note, though, that this meta-analysis focused primarily on studies of students in K-12 settings.

Among academic leaders, the concern about overall student retention is growing (Allen & Seaman, 2014). Historically, studies of online retention rates confirmed that many colleges and universities retain fewer online students than their face-to-face counterparts (Fetzner, 2013). Academic quality is a major factor when attracting and retaining students to programs and universities. A look at the research reveals that quality is an ongoing topic when comparing online and traditional courses. But does quality matter to students?

To understand whether students value quality in courses, it is important to understand quality and a brief history of the standards movement. With the 1983 release of *A Nation at Risk* (National Commission on Excellence in Education [NCEE], 1983), there was a strong public push toward "rigorous and measurable standards, and higher expectations for academic performance and student conduct" (NCEE, p. 27).

About the same time, a foundational set of principles to serve as a guide for teaching in higher education was developed by Chickering and Gamson (1987). Their resulting seven principles for university teaching have served as a benchmark for effective teaching and learning at the university level. The seven principles are: encouragement of contact between students and faculty, development of reciprocity and cooperation among students, encouragement of active learning, provision of prompt feedback, emphasis on time given to tasks, communication of high expectations, and respect for diverse talents and ways of learning. Although they emphasized undergraduate education, these principles are also applicable to graduate education, K-12 schools, and other learning environments.

Building on the need for standards at the university level, Merrill (2002) analyzed design theories of effective instruction. He advanced the idea of five "first principles" of instruction: learning is promoted when learners are engaged in solving real-world problems, learning is promoted when existing knowledge is activated as a foundation for new knowledge, learning is promoted when new knowledge is demonstrated to the learner, learning is promoted when new knowledge is applied by the learner, and learning is promoted when new knowledge is integrated into the learner's world.

With the advent of online education, the need for standards to determine quality arose. QM originated from a grant project entitled "Fund for the Improvement of Postsecondary Education." It is a faculty-centered, peer review-based process that is designed to certify the quality of online and blended courses and components and assure continuous improvement. The eight research-based standards and elements developed were selected because of empirical evidence demonstrating they had a positive impact on student learning.

The QM framework emphasizes navigability, interaction, and instructional alignment. Specifically, the eight standards included in the QM rubric are:

- Course overview and introduction
- Learning objectives
- Assessment and measurement
- Instructional materials
- Learner interaction
- Course media and technology
- Learner support
- American Disabilities Act (ADA) compliance

Each standard includes a number of indicators, each of which is ranked in importance and assigned a weight, where essential = 3, very important = 2, and important = 1.

The QM rubric continues to evolve based on the research literature related to online course design. Shattuck and Diehl (2011) completed a thorough review of the relevant literature and compiled a summary of the research supporting the 2011-13 version of the QM rubric. The extensive research base supporting the QM rubric lends credibility to the instrument. But what do students value in their courses and how do student perceptions of quality

align with those supported by the research? As Ralston-Berg (2014) argued, students are the consumers of courses, and they may have a differing perspective on what constitutes a quality-oriented course.

Many research studies have explored students' perceptions of quality in online courses (e.g., Chitkushev, Vodenska, & Zlateva, 2014; Paechter & Maier, 2010; Robins, Simunich, & Kelly, 2013; Young & Norgard, 2006). Other research projects examine students' perceptions of the QM criteria specifically (e.g., Lyengar, 2006; Mott, 2006; Bowen & Bartoletti, 2009, all as cited in Shattuck, 2012). These studies report that students perceived the elements contained in the QM rubric to be important, but the studies have had a limited scope and the findings have not been widely disseminated.

Ralston-Berg (2014) conducted the most extensive investigation of online students' perceptions of the importance of the QM criteria. Her report summarized the results of a survey of 3,160 students enrolled in 31 institutions spanning 22 states. She found that students valued each of the statements associated with a QM criterion, and the value ratings of many statements were similar to the weights assigned by QM. She also found that some statements weighted by QM as "3" (essential) were rated more than one point lower by students. Similarly, she found that some statements weighted by QM as "1" (important) were rated more than one point higher by students.

This study went beyond the comparisons reported by Ralston-Berg (2014). It examined students' perceptions of the QM statements for courses in general (not just online courses). It also aimed to determine whether the differences between students' perceptions of what is valued in a course and QM's ratings for what is considered a quality-oriented course are practically significant. Understanding these differences has the potential to help institutions of higher learning with the development and promotion of quality course offerings.

Methods

Research Questions

Using the QM criteria as a framework for examining perceptions of quality in college-level courses, this research study addressed two primary research questions.

- Question 1: What do students value in a college-level course?
- Question 2: How do students' ratings of standards and criteria compare with those of course designers and developers of quality criteria?

Participants

One hundred eighty-three students attending a regional campus of a Midwestern public university participated in the study. Seventy-five percent of the respondents were female and attending the university full time (67%). They represented a wide range of ages (as shown in Table 1), which is consistent with the diverse student body.

Table 1: Age of Respondents

Age Range	Number of Respondents	Percentage of Respondents
18-23	55	30.2%
24-29	31	17.0%
30-39	37	20.3%
40-49	27	14.8%
50-59	25	13.7%
60 or older	2	1.1%

Survey Instrument

The survey contained 68 student-centered statements based on the QM criteria. These statements reflect those used by Ralston-Berg (2014) but were modified to reflect all courses (not just online courses). For each statement, students indicated the importance of each feature to the success of a course (4-point scale: 3 = essential, 2 = very important, 1 = important, 0 = not at all important). The questionnaire also contained items on course satisfaction and effectiveness, perceptions of online education, and demographics.

Procedure

The questionnaire was administered electronically to all students attending the university. Participation was solicited through multiple communication channels including announcements in the university's course management system and messages sent to an "All Students" email distribution list.

Results

Participants valued each QM criterion for all courses, with all statements receiving a value rating of greater than 1 (with 1 indicating an "important" rating). Participants made meaningful discriminations between the QM criteria with mean value ratings ranging from 1.23 to 2.61 on a 4-point scale (3 = essential, 2 = very important, 1 = important, 0 = not at all important). Table 2 (end of article) summarizes the participants' mean rating for each QM statement, shown in descending order of importance.

To better understand how students' perceptions of what is valued in a course compare with QMs' weights for statements

describing online courses, one-sample t-tests were computed for the mean participant rating score and the QM weight for each statement. The effect size was also calculated using Cohen's *d* to identify practically significant findings. The results of the t-tests and effect sizes are reported in Tables 3 through 5.

Table 3 (end of article) shows that all statements weighted as "essential = 3" by QM were valued significantly less by respondents. To identify those items with the biggest discrepancy in value ratings between participants and QM, effect sizes were examined. Effect sizes greater than 0.8 are considered large, with increasing d-values signifying a greater effect.

Although all respondents' ratings in Table 3 were significantly less than the QM value, there were three items with an effect size less than 0.8, indicating a smaller mean difference and lower practical significance. Students greatly value clear instructions for getting started in a course, a clearly stated grading policy, and a clear explanation of how work will be evaluated.

Two items weighted as essential by QM were rated more than one point lower in importance by participants. Respondents, as compared to the designers of the QM instrument, place significantly less weight on the importance of learning activities that require interaction with the instructor or other students.

Table 4 (end of article) shows that one item weighted as "very important = 2" by QM was valued significantly less by respondents, and several items were valued significantly more by respondents. It is important to note than no items weighted as "very important = 2" by QM had an effect size which indicated a meaningful, practical difference between the QM ranking and participants' value rating. The mean difference between the QM weight and participants' ratings for all items was less than 0.4.

Table 5 (end of article) shows that all statements weighted as "important = 1" by QM were valued significantly more by respondents, most of them at a practically significant level. Two statements did not have a practically significant effect (d-value >0.8). For these two statements, respondents, as compared to the designers of the QM instrument, gave less weight to the importance of introducing oneself to the class and having netiquette guidelines clearly stated.

There were several statements in this group for which respondents' ratings were more than one point higher (on the four-point scale) than the QM weight. Respondents felt it was very important that the course take full advantage of available tools and media, that instructions explain how to access resources, and that course components are easily downloadable for offline use. Respondents also felt strongly that the minimum preparation and prerequisite knowledge be clearly stated. Screen readability and proper citation for all course materials and resources were also more highly valued by respondents than by QM.

Discussion

Although the QM framework focuses on online courses, this study provided initial support for use of the tool more broadly. When the importance ratings for each QM-based survey item in the current study were compared with the overall importance ratings reported by Ralston-Berg (2014), there were clear similarities. Specifically, students appear to value the QM criteria regardless of the course format.

In both the current and Ralston-Berg (2014) studies, the following statement was rated by students as most important: "Clear instructions tell me how to get started and how to find various course components." Regardless of the course format, students feel it is crucial that they get off to a good start and be able to easily locate course materials.

Several items related to assessment were also in the top eight in both studies. Those statements included:

- The grading policy is stated clearly.
- Criteria for how my work and participation will be evaluated are descriptive and specific.
- Assessments are appropriately timed within the length of the course, varied, and appropriate to the content being assessed.
- Assessments measure the stated learning objectives and are consistent with course activities and resources.

Students felt it was critical that assessments were appropriate and relevant and that there were well-defined statements about how their work would be assessed. This is consistent with the value QM places on these statements, as each is weighted 3 (essential), with the exception of the statement related to the timing of assessments (which is weighted 2 = very important). This finding is a good reminder to faculty about the importance of developing clear and appropriate guidelines that show how students will be assessed.

Concerning what students value least, there were similarities in the ratings between the current and the Ralston-Berg (2014) study. In both, the statement that received the lowest value rating is "I am asked to introduce myself to the class." It is interesting that students place little value on getting to know others in their class, regardless of the course format. It is important to note that QM also weights this item low (1 = important) and does not view student introductions as essential to success in a course. In fact, the rating for this item given by students in the current study is significantly higher than QM's weight, although the difference is not practically significant.

Consistent with students' lack of value on self-introductions, two other statements related to learning activities encouraging interaction with peers and the instructor appeared in the bottom

10 in both the current and Ralston-Berg's (2014) study. This suggests that students do not value collaboration and do not view it as a means to learning. QM weights these items as essential (3), which makes the difference both statistically and practically significant. The research on which QM's criteria are based clearly emphasizes the importance of interaction in online classes and additional research echoes its importance for non-online courses (e.g., Kirschner, Paas, & Kirschner, 2009). However, these findings are evidence that students do not value and may resist interaction in courses.

Knowing that students are resistant to interaction has important implications for course design and facilitation. Faculty need to be encouraged to include interaction in all course formats as appropriate interaction with others in a variety of settings is critical for success in the 21st century (e.g., Larson & Miller, 2011; Partnership for 21st Century Skills, 2009). A possible reason for students' resistance to interaction and collaboration may be that they have had deficient experiences in previous courses. Faculty must ensure that the interaction required in courses is relevant, appropriate, and well-structured. Providing faculty development opportunities focused on designing and facilitating high-quality group interactions is one way institutions can perhaps begin to change students' perceptions related to interaction in their courses.

Another way for faculty to ensure the high quality of their courses from the student perspective is to be careful and deliberate in their use of tools, media, resources, and course components. While criteria related to these elements are rated as important in the QM framework, students valued them significantly more. Specifically, students felt it was important for courses to make good use of the available tools and media to benefit learning. Course management systems offer a variety of instructional, assessment, collaborative, and media-based tools that have the potential to support and enhance student learning. Students want to engage in learning environments that utilize these tools and provide clear directions for accessing and using them.

Conclusions

This study extended the work of Ralston-Berg (2014), and suggested that quality as defined by QM is applicable beyond online courses. One area of particular interest is in relation to interaction and collaboration in courses. Research confirms the value of these elements in courses, but students do not appreciate their value for learning. It is important that faculty include collaborative activities in their courses and design such activities to ensure student success. When faculty are trained and quality elements (as defined by QM standards) are built into the design of a course, students derive a high-quality experience that may result in increased satisfaction, learning, and retention.

Regardless of the course format, faculty and course developers should pay special attention to the following QM criteria to develop an effective course from a student's perspective:

- Provide clear instructions for how to get started in a course and a clear explanation of how to navigate course materials and resources.
- Clearly explain how students' work will be assessed and how grades will be calculated.
- Include relevant and timely assessments that are clearly connected to course objectives.
- Ensure that necessary materials/resources are easily available and clear directions tell students how to access them.
- Include meaningful opportunities for peer interaction, being sure to clearly communicate the relevance and value of such activities. Avoid requiring peer interaction when it is not central to the learning objectives.

Limitations and Future Research

The nature of this survey-based study introduced potential limitations. A survey was deemed to be the most appropriate way to collect data from students efficiently. However, relying on a single data-collection source created the potential for mono-method bias. Similarly, the nature of a survey is that it relies on self-report data, which can produce a social-desirability bias. Given that it was unlikely participants knew the research questions and there were not clear socially desirable responses, the potential for this effect to impact the findings was minimal. Future research should seek to further explore and substantiate these findings with rich, qualitative data, perhaps in the form of interviews or focus groups with students.

Additionally, future research should seek to obtain a larger sample size to allow for more stratification of the sample to better understand the factors impacting students' ratings of the QM statements. Specifically, it would be of interest to determine if factors such as gender, age, previous online course experience, or the academic achievement of students impact students' perceptions of quality in their courses.

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Table 2: QM Statements in Order of Descending Mean Importance as Rated by Participants

QM #	QM-Based Questionnaire Statement	QM rating	Mean	SD
1.1	Clear instructions tell me how to get started and how to find various course components.	3	2.61	0.70
3.2	The grading policy is stated clearly.	3	2.50	0.70
3.3	Criteria for how my work and participation will be evaluated are descriptive and specific.	3	2.43	0.77
3.4	Assessments are appropriately timed within the length of the course, varied, and appropriate to the content being assessed.	2	2.38	0.77
2.5	The learning objectives are appropriate for the level of the course.	2	2.38	0.80
5.3	Clear standards are set for instructor availability (office hours, etc.).	2	2.37	0.79
6.4	Technologies required are readily available.	2	2.34	0.87
3.1	Assessments measure the stated learning objectives and are consistent with course activities and resources.	3	2.32	0.79
6.6	Instructions on how to access resources online are sufficient and easy to understand.	1	2.31	0.84
4.1	Instructional materials contribute to the achievement of the course and module/unit learning objectives.	3	2.27	0.84
5.1	The learning activities promote the achievement of the stated learning objectives.	3	2.27	0.85
2.4	Instructions on how to meet the learning objectives are adequate and stated clearly.	3	2.27	0.83
2.1	The course learning objectives describe outcomes that I am able to achieve.	3	2.26	0.81
4.2	The relationship between the instructional materials and the learning activities is clearly explained to me.	3	2.25	0.83
6.3	Navigation is logical, consistent, and efficient.	3	2.24	0.88
2.2	The module/unit learning objectives describe outcomes that I am able to achieve; consistent with course objectives.	3	2.22	0.84
5.3	Clear standard set for instructor response.	2	2.22	0.84
4.3	Instructional materials have sufficient breadth, depth, and currency for me to learn the subject.	2	2.19	0.90
5.4	Requirements for my interaction with the instructor, content, and other students are clearly explained.	2	2.19	0.89
5.2	Learning activities encourage me to interact with content in the course.	3	2.15	0.87
6.1	Tools and media used are appropriate for the content being delivered.	3	2.12	0.91
8.4	Course ensures screen readability.	1	2.12	0.97
1.6	Minimum preparation or prerequisite knowledge I need to succeed in the course is clearly stated.	1	2.10	0.92
2.3	All learning objectives are clearly stated and written from my perspective.	3	2.09	0.88
6.2	Tools and media support engagement and guide student to become an active learner.	3	2.08	0.92
8.1	Course is accessible to people with disabilities.	3	2.08	1.00
6.5	The course components are web-based or easily downloaded for use offline.	1	2.07	1.03
1.2	A statement introduces me to the purpose of the course and its components.	3	2.05	0.87

Table 2: QM Statements in Order of Descending Mean Importance as Rated by Participants (Continued)

6.7	The course design takes full advantage of available tools and media.	1	2.05	0.91
4.4	All resources and materials used in the course are appropriately cited.	1	2.04	1.00
6.1	Tools and media used support the achievement of learning objectives.	3	2.03	0.94
3.5	"Self-check" assignments are provided, and I am provided with timely feedback.	2	1.98	1.04
1.7	Minimum technical skills expected of me are clearly stated.	1	1.96	0.96
5.2	Learning activities encourage me to interact with my instructor.	3	1.94	0.93
1.3	The instructor introduces her- or himself.	1	1.93	0.95
8.3	Course includes web links that are self-describing and meaningful.	2	1.89	1.07
7.2	Course includes or links to a clear explanation of how the institution's academic support system can assist me in effectively using the resources provided.	2	1.89	0.96
7.1	Course includes or links to a clear description of the technical support offered.	2	1.89	0.91
7.3	Course includes or links to a clear explanation of how the institution's student support services can help me reach my educational goals.	1	1.84	0.93
7.4	Course includes or links to tutorials and resources that answer basic questions related to research, writing, technology, etc.	1	1.81	0.92
5.2	Learning activities encourage me to interact with other students.	3	1.69	1.00
1.3	Etiquette (or "netiquette") guidelines for how to behave online are clearly stated.	1	1.63	1.05
1.5	I am asked to introduce myself to the class.	1	1.23	1.05

Table 3: Comparison of Participant Values to QM Values for Items Ranked "3 = Essential" by QM
*$p<0.05$, **$p<0.01$, ***$p<0.001$, §$d>0.8$, §§$d>1.0$

QM #	QM Statement	N	Mean	SD	*t*	*p*	Mean Diff.	*d*
1.1	Clear instructions tell me how to get started and how to find various course components.	178	2.61	0.70	-7.41	0.000**	-0.39	0.56
3.2	The grading policy is stated clearly.	169	2.50	0.70	-9.35	0.000**	-0.50	0.72
3.3	Criteria for how my work and participation will be evaluated are descriptive and specific.	166	2.43	0.77	-9.53	0.000**	-0.57	0.74
3.1	Assessments measure the stated learning objectives and are consistent with course activities and resources.	167	2.32	0.79	-11.02	0.000**	-0.68	0.85§
5.1	The learning activities promote the achievement of the stated learning objectives.	173	2.27	0.85	-11.38	0.000**	-0.73	0.87§
2.4	Instructions on how to meet the learning objectives are adequate and stated clearly.	170	2.27	0.83	-11.50	0.000**	-0.73	0.88§
4.1	Instructional materials contribute to the achievement of the course and module/unit learning objectives.	166	2.27	0.84	-11.28	0.000**	-0.73	0.88§
2.1	The course learning objectives describe outcomes that I am able to achieve.	171	2.26	0.81	-11.92	0.000**	-0.74	0.91§
4.2	The relationship between the instructional materials and the learning activities is clearly explained to me.	166	2.25	0.83	-11.63	0.000**	-0.75	0.90§
6.3	Navigation is logical, consistent, and efficient.	163	2.24	0.88	-11.03	0.000**	-0.76	0.86§
2.2	The module/unit learning objectives describe outcomes that I am able to achieve; consistent with course objectives.	171	2.22	0.84	-12.15	0.000**	-0.78	0.93§
5.2	Learning activities encourage me to interact with content in the course.	165	2.15	0.87	-12.60	0.000**	-0.85	0.98§
6.1	Tools and media used are appropriate for the content being delivered.	165	2.12	0.91	-12.54	0.000**	-0.88	0.98§
2.3	All learning objectives are clearly stated and written from my perspective.	167	2.09	0.88	-13.31	0.000**	-0.91	1.03§§
6.2	Tools and media support engagement and guide student to become an active learner.	163	2.08	0.92	-12.73	0.000**	-0.92	1.00§§
8.1	Course is accessible to people with disabilities.	162	2.08	1.00	-11.67	0.000**	-0.92	0.92§
1.2	A statement introduces me to the purpose of the course and its components.	177	2.05	0.87	-14.58	0.000**	-0.95	1.10§§
6.1	Tools and media used support the achievement of learning objectives.	166	2.03	0.94	-13.34	0.000**	-0.97	1.04§§
5.2	Learning activities encourage me to interact with my instructor.	174	1.94	0.93	-15.15	0.000**	-1.06	1.15§§
5.2	Learning activities encourage me to interact with other students.	171	1.69	1.00	-17.20	0.000**	-1.31	1.32§§

Table 4: Comparison of Participant Values to QM Items Weighted as "2 = Very Important" by QM
*$p<0.05$, **$p<0.01$, ***$p<0.001$, §$d>0.8$, §§$d>1.0$

QM #	QM Statement	N	Mean	SD	*t*	*p*	Mean Diff.	*d*
8.2	Course includes equivalent alternatives to audio and visual content.	159	1.71	1.09	-3.34	0.001**	-0.29	0.26
7.1	Course includes or links to a clear description of the technical support offered.	166	1.89	0.91	-1.53	0.129	-0.11	0.12
7.2	Course includes or links to a clear explanation of how the institution's academic support system can assist me in effectively using the resources provided.	165	1.89	0.96	-1.47	0.145	-0.11	0.11
8.3	Course includes web links that are self-describing and meaningful.	163	1.89	1.07	-1.32	0.188	-0.11	0.10
3.5	"Self-check" assignments are provided, and I am provided with timely feedback.	165	1.98	1.04	-0.30	0.764	-0.02	0.02
4.3	Instructional materials have sufficient breadth, depth, and currency for me to learn the subject.	166	2.19	0.90	2.68	0.008**	0.19	0.21
5.4	Requirements for my interaction with the instructor, content, and other students are clearly explained.	173	2.19	0.89	2.81	0.005**	0.19	0.21
5.3	Clear standard set for instructor response.	172	2.22	0.84	3.46	0.001**	0.22	0.26
6.4	Technologies required are readily available.	164	2.34	0.87	4.91	0.000***	0.34	0.38
5.3	Clear standards are set for instructor availability (office hours, etc.).	172	2.37	0.79	6.19	0.000***	0.37	0.47
2.5	The learning objectives are appropriate for the level of the course.	171	2.38	0.80	6.23	0.000***	0.38	0.48
3.4	Assessments are appropriately timed within the length of the course, varied, and appropriate to the content being assessed.	167	2.38	0.77	6.37	0.000***	0.38	0.49

Table 5: Comparison of Participant Values to QM Items Weighted as "1 = Important" by QM
*$p<0.05$, **$p<0.01$, ***$p<0.001$, §$d>0.8$, §§$d>1.0$

QM #	QM Statement	N	Mean	SD	*t*	*p*	Mean Diff.	*d*
1.5	I am asked to introduce myself to the class.	173	1.23	1.05	2.89	0.004**	0.23	0.22
1.3	Etiquette (or "netiquette") guidelines for how to behave online are clearly stated.	177	1.63	1.05	7.92	0.000***	0.63	0.60
7.4	Course includes or links to tutorials and resources that answer basic questions related to research, writing, technology, etc.	165	1.81	0.92	11.30	0.000***	0.81	0.88§
7.3	Course includes or links to a clear explanation of how the institution's student support services can help me reach my educational goals.	165	1.84	0.93	11.52	0.000***	0.84	0.90§
1.4	The instructor introduces her- or himself.	177	1.93	0.95	13.04	0.000***	0.93	0.98§
1.7	Minimum technical skills expected of me are clearly stated.	178	1.96	0.96	13.33	0.000***	0.96	1.00§§
4.4	All resources and materials used in the course are appropriately cited.	166	2.04	1.00	13.44	0.000***	1.04	1.04§§
6.7	The course design takes full advantage of available tools and media.	164	2.05	0.91	14.72	0.000***	1.05	1.15§§
6.5	The course components are web-based or easily downloaded for use offline.	164	2.07	1.03	13.29	0.000***	1.07	1.04§§
1.6	Minimum preparation or prerequisite knowledge I need to succeed in the course is clearly stated.	176	2.10	0.92	15.85	0.000***	1.10	1.20§§
8.4	Course ensures screen readability.	163	2.12	0.97	14.68	0.000***	1.12	1.15§§
6.6	Instructions on how to access resources online are sufficient and easy to understand.	166	2.31	0.84	20.03	0.000***	1.31	1.55§§

Quality Approaches in Higher Education

Transforming learners from participants to coproducers to meet the challenges of a dynamic knowledge base.

Coproduction of Knowledge: A Literature Review and Synthesis for a University Paradigm

Munirudheen Athakkakath, Azzah Al-Maskari, and A. Kumudha

Abstract

The mission of education is manifold. The responsibility of the service providers of education does not end with making education available to students but, it extends to ensure that education provided is optimally co-created by students along with other stakeholders. Increased demand for coproduction in education from student-beneficiaries supported by creative learning inputs can trigger delivery of dynamic inputs from the lecturers toward coproduction. This article presents and proposes a coproduction framework to transform the learners from mere participants to co-producers. The coproduction framework is developed by applying marketing concepts to existing theories and practices of learning. The proposed model should enhance the development and sustainability of life skills out of education and expedite the rate of human capital formation in society. This article further recommends effective application of social marketing to successfully operationalize the model.

Keywords

Pedagogy, Absorption, Participation, Coproduction, Operant Resources, Operand Resources, Cognitive and Emotional Components, Intrinsic Price, Beneficiary Producer and Regular Producer, Demand and Supply, Social Marketing

Introduction

One of the greatest missions of modern education at all levels of the educational pyramid, public or private, is to build a "knowledge economy." Provision of education is an initial step toward a comprehensive process of building a knowledge economy. Developing countries have a fairly reasonable number of higher education institutions either in the public or private sector. Nevertheless, there are studies across the globe that reflect on the mismatch between the expectations of employers and the competencies of graduates. Turnbull (2009) cited a study wherein employers in the United Kingdom consider their graduates insufficiently prepared to enter into professional fields on grounds of quality. The study criticizes the poor role being played by the educational institutions in developing employability skills among the graduates. Students attain employability skills through involvement in both academic and extracurricular activities. On the other hand, it is noteworthy to understand that there are theories of learning and concepts in education which generally guide or at least dominantly lead the academic practices of students and lecturers.

Astin (1993) did a large-scale correlational study of what matters in college involving 27,064 students at 309 baccalaureate-granting institutions. The research found that a cooperative classroom rather than a competitive classroom promotes both student-to-student interactions and student-to-faculty interactions in the teaching and learning process. These two forms of bi-dimensional interactions carry high weights and major effects on the academic development, the development of personal competency, and satisfaction of college students. The study indicated that compatibility of students' learning approaches with the instructional style of the lecturer is much more important than the formal curriculum.

Sadlo and Richardson (2003) discussed three major learning approaches: surface learning, deep learning, and strategic learning approaches. They observed that a change in the conception of learning by students is required to achieve superior quality education. They

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further cited a study which contends that educational interventions alone are insufficient to change this conception of students. Conversely, Redish and Smith (2008) observed that most of the approaches to curriculum development, design of instruction, and assessment do not keep pace with the conception regarding the cognition of the learners, learning styles, and the requirements of domain subject. They have been designed on the basis of implicit and highly limited conceptions of learning and outdated theories and models. Observations of both Sadlo and Richardson (2003) as well as Redish and Smith (2008) indicate the need for transformation in the conception of learning by students.

Drawing from the observations of Sadlo and Richardson (2003) regarding the need for extra-educational interventions, it is desirable to look beyond the theories of education to address issues pertaining to employers' expectations regarding graduates' attributes and competencies. Today's workplace, either commercial or philanthropic in nature, is guided by the principles and concepts of management in an incremental proportion. The process of managing professional fields, whether for profit or for services, is dominantly guided by Total Quality Management (TQM) concepts, which focus on enhancing the value available to the clients and customers. Additionally, the logic of viewing the utility of outputs from the standpoint of end users rather than providers has increasingly been recognized as promising. Employers as end-users of graduates can provide constructive feedback to universities, which will be instrumental in improving educational processes and practices. Winn and Green (1998) categorized students and employers as the primary customers of universities. They assert that employers' expectations are met well through the measures to develop the employability skills and competencies of students in the university, which, in turn, will satisfy the rest of the stakeholders.

Students' employability skills can be enhanced by applying the modern concept of value creation, which is popularly applied by business organizations in the domain of service marketing. According to the conventional assumption, value was created on a value chain by the producers and passed on to the beneficiaries. In a value chain, value is generally audited on the results. On the other hand, it has been shown recently that value can be created by all the actors (known as value cocreation) of a value network involving producers as well as beneficiaries. In a value network, value can be measured, monitored, and added during the process and sub-processes by all actors (Ramirez, 1999). Such processes of value creation are not simply a successive linear transfer of value in a chain from a producer to a beneficiary. Rather it is an interactive and synchronized value network webbed into multi-dimensional directions involving an increased number of creators at different stages starting from production until the utilization of value. Such a value cocreation is the spirit and foundation of coproduction in teaching and learning as discussed in this article.

Drawing from the previously discussed marketing concept of value creation, it can be deduced that quality of education and that of the graduates is better enhanced through collective efforts of students, professors, and potential employers.

Hence, this article contends that the concept of coproduction can be a declared agenda of two-dimensional student interactions promulgated by Austin (1970). Such an agenda, if adopted in the mission of a university, will help the process of coproduction to dominate in the student engagement space. Drawing from W. Edwards Deming's 14 points of TQM, Winn and Green (1998) also emphasized the importance of adopting a new philosophy built into the teaching and learning process in the university classroom different from the philosophies habituated from schools.

Many authors (e.g., Shaeffer, 1994; Swanson & Holton, 2001; Vargo & Lusch, 2004; Bovaird, 2007) have advocated the significance of coproduction with enhanced focus on contributions of beneficiaries. Service production in education should have active involvement of students. According to Ostrom (1996), capability-building services are always coproduced by stakeholders. As education is a capability-building experience, students should be actively involved in the coproduction process to utilize optimally the infrastructure and inputs provided by the service providers. Bovaird (2007) also asserted that students should play a central role in the coproduction of knowledge. They shall perform the learning tasks guided by the "enabling" role of lecturers in a relationship equivalent to that of clients and service professionals.

There are some elements of value creation jointly contributed by different stakeholders of higher education, which can be acknowledged as coproduction existing in higher education institutions. Hénard (2008) found elements of coproduction involving internal as well as external stakeholders, project-style learning, and co-governance of programs existing in higher education institutions (HEIs) as discovered in a project study involving 29 HEIs of the world. Since the 2007-08 academic year, there has been a new coproducing group of professors, students, and industry experts in the Arcada University of Applied Sciences in Finland. The university plans and practices a new type of self-assessment procedure in selected departments. Students and other stakeholders also bring new ideas from different angles, other than the teachers, which enrich the learning strategy of the university. There is collaboration among students and staff to generate all kinds of actions for improvement in the teaching-learning process at the Copenhagen Business School in Denmark and at Alverno College in the United States, which also exemplifies a coproduction process. The major objective of an evaluation tool designed (Higher Education Self-Assessment of Competences)

for academic courses at the Free University of Berlin, Germany, is acquisition of competencies by students rather than mere acquisition of knowledge. Conversely, this objective is similar to the objectives of the coproduction framework being proposed in this article. The Business Partner Chairs at the Higher School of Economics of State University in Russia form project educational laboratories comprised of researchers, junior students, and professors. Such labs are connected with leading companies, analytical centers, and governmental bodies. They modify curricula and participate in applied research (Hénard, 2008).

Integrating scholarship from the best practices and concepts of co-disciplines and cross-disciplines provides greater grounding for improving practices in a particular field of study (Boyer, 1991). Conversely, the methodology proposed in this article is a critical and creative evaluation of marketing management concepts used to draw insights from the coproduction practices of service marketing and to integrate them with current practices in education. Consequentially, it visualizes new roles for student-beneficiaries by promoting new patterns of relationships among dominant stakeholders of higher education.

Background: Social Interdependence and Student Attributes

A culture of cooperative interdependence, a competitive interdependence, or absence of interdependence may guide the interactions of students depending upon the culture of the society as whole. Cooperative interdependence among students delivers higher results in the realm of student development (Johnson, Johnson, and Smith, 2007). Therefore, the students patterned through cooperative interdependence practices will provide strong grounding for encouragement of coproduction in learning.

Educational psychologists, curriculum developers, and researchers have been developing learning theories, which explain the process of learning established concepts, theories, and practices of various domains (e.g. Donovan, Bransford, & Pellegrino, 1999; Dunn & Griggs, 2000; Carnell, Lodge, Wagner, Watkins, & Whalley, 2000). Further, there have been wide discussions in the literature to improve the quality in teaching and learning (Padró, 2011). However, these literature deliberate on frameworks focusing on instructional style of lecturers. In fact, fairly reasonable coverage should be given to the formulation of knowledge and development of skills by students themselves, taking into consideration the previously mentioned nature and attributes of students.

Different theories and models of learning present learning approaches grounded on pure absorption (memorization) orientation as well as critical thinking orientation. That is, learners follow different approaches of learning, which have elements of absorption and critical thinking in varying proportions.

As noted earlier, there are few authors who observed the importance of coproduction in teaching and learning. A framework (Figure 1) is formulated with the help of existing theories and practices in education in order to make critical reflections on overemphasis of the presentation mode of teaching and memorization mode of learning.

Pedagogical Gift Framework

The framework in Figure 1, a pedagogical gift framework, is the base for the analytical purpose in this article. This framework was designed by the authors of this article after incorporating the ideas presented in the studies of Browne and Keeley (1981), Askew and Carnell (1998), and Horne and Shirley (2009). In this framework, educating students is more of a knowledge-transferring process than a knowledge-creation process where information and content flow from the lecturer to the student. Hence, the lecturer's presentation skills will have a bearing on the quality of the acquisition process.

Reflections on Pedagogical Framework

While assuming the pedagogical gift approach, lecturers are considered as authority on the content. Students consider lecturers to be dominantly responsible for the unilateral transfer of knowledge. They introduce skills to the students. Hence, the relationship between a lecturer and a student is like a transferor and a transferee. Lecturers either collect the content or create knowledge. Students, on the other hand, act as receivers of knowledge. One advantage of this approach is that the students can store the knowledge and reuse it in a stable environment when needed. Contrary to that, the opportunities calling for use of knowledge

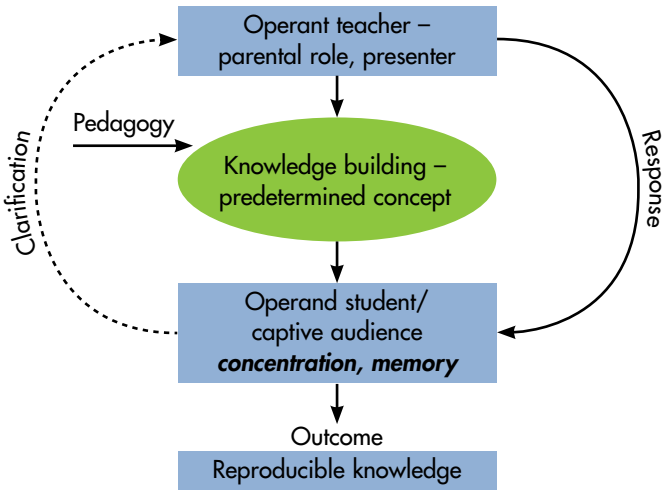

Figure 1: A Pedagogical Gift Framework
Source: (Browne & Keeley, 1981; Askew & Carnell, 1998; Horne & Shirley, 2009)

is fast changing (Carnell et al., 2000; Bryce & Withers, 2003). Therefore, the outcome of the process of education should enable the student to face the challenges of a dynamic knowledge base successfully. Smith, Sheppard, Johnson, and Johnson (2005) discussed a similar model for use in engineering education, the "Pour it In" model developed by Lila Smith. The pedagogical framework is similar to the Pour it In model in terms of direction of flow of content and information. Smith et al. (2005) observed that this model is predicated on the rote notes by the lecturer and rote memorization by the students.

Further, it is a linear approach of knowledge transfer which encourages individual learning efforts rather than cooperative learning effort because the faculty-to-student interactions lead the transfer of knowledge. Cooperative student-to-student interactions are not an essential element of this transfer. It is suitable for transferring absolute knowledge rather than facilitating learning of know-how through trial and error by students. Hence, it forestalls students from gaining and developing skills to do a particular task independently in future.

Conversely, the following paragraphs highlight several learning models which emphasise the participation of students in the learning and teaching process with regard to the existing knowledge.

Pascarella and Terenzini (2005) proposed the "College Impact Model" to improve college outcome by influencing inter-student and environmental variables of student engagement. They observed that institutions should focus on shaping their academic, interpersonal, and extracurricular offerings to encourage student engagement. According to these researchers, instructional and programmatic interventions can enhance knowledge acquisition as well as active engagement toward cognitive and psychosocial development of students. However, this model does not explicitly cover cocreation of value by students as the purpose of the academic responsibility.

Weaver and Qi (2005) came up with a "Path Model" which estimates the impact of attributes and perceptions of students on class participation and learning. They reported low class participation of college students in the learning process. They concluded that students' characteristics, mostly internal ones, influence their perception, which, in turn, affects their participation in the learning process. They noted that students' perceived ability deficit, lack of confidence, and lack of preparation of the introductory courses hamper students' willingness to participate in the class.

Smith et al. (2005) quote the work of Christensen to assert that engaging students in learning is principally the responsibility of the lecturer. It is interesting to note that the study treats a lecturer as a designer and facilitator of learning experiences and opportunities rather than an imparter of knowledge. Further, this approach refuses the spirit of the presentation mode in teaching and encourages deep understanding by students in learning.

As elaborated earlier, students are found to engage in either cooperative, competitive, or individual efforts to attain learning goals. The "Keep it Flowing Model" drawn by Lila Smith as discussed in Smith et al. (2005) is a teaching-learning process grounded on cooperation where students among themselves as well as with faculties work together to accomplish shared learning goals. Cooperative learning encourages individual students to seek outcomes which are beneficial to themselves and to all other students. Cooperative learning groups are founded on principles of positive interdependence, individual responsibility, and collective accountability for the work.

It is a general truth that learning goals could be as varied as understanding the concepts deeply, learning to do a task, creating something new to the students, or creating something new to the world. The similarity between cooperative learning and coproduction lies with the presence of a partnership among actors in learning. Alternatively, cooperative learning is more about the positive environment of student engagement; whereas the purpose, goals, and process of student engagement are clearly defined in coproduction. That is, the purpose is creation and the process is cocreation along with the lecturer and peers in a coproduction framework. Integrating cooperative learning into creative learning will improve the match between what employers require and what students graduate with from the universities. Hence, a coproduction framework explicitly re-conceptualizing a comprehensive cocreation is described in this article.

Kuh (2013) observed that the student behaviors, institutional actions, and students' previous knowledge influence students' learning and development. He stressed the need for understanding the meaning and value of engagement by faculty, administrators, and students. Understanding of students from the perspective of a "service-centered dominant logic of marketing" can make beneficiaries actively involved in the knowledge-gaining and creating process. A service-centered dominant logic of marketing focuses on the transformation of the student into an operant resource from an operand resource (Vargo & Lusch, 2004). This view considers students as creators of knowledge and skills rather than mere active receivers and users of knowledge interacting with the sources of such knowledge. The authors of this article suggest ascribing the conception of operant resources to beneficiary-students and enabling them to understand the meaning and value of engagement in the logic of marketing, which will transform student behavior.

Operant resources assume that both lecturers and students are part of the knowledge-building and capability-enhancing process, which is different from the conception of operand resources.

On the other hand, operand resources assume that knowledge is transferred to them by lecturers. If students perceive themselves as operand resources or lecturers perceive them as operand resources, they cannot become better partners in the knowledge-building process. Similarly, participation in the transfer of existing knowledge or that formulated by the lecturers help students critically evaluate and arrive at their own conclusions. However, coproduced knowledge provides peers and lecturers an opportunity to critically evaluate, comment, and conclude on the contributions of co-students. For this to happen, the self-concept of a student should undergo a paradigm shift to transform a student-participant into a co-producer. This outlook is in line with the observation of Joshi (2004), who noted that coproduction requires major changes in the roles and responsibilities of stakeholders. Vargo and Lusch (2004) also emphasized the importance of enhancing the role of beneficiaries in the service coproduction. According to them, beneficiaries should act proactively to enhance the quality of output as they transform themselves to be operant resources.

If a comprehensive coproduction philosophy for knowledge building is introduced in a university, it will help maximize the overall efficiency of the university. This could be achieved through appropriate, judicious, and sustainable utilization of inputs by students and lecturers; some of them are critical inputs and are mutually exclusive contributions. Students' efforts, mental ability, cognitive skills, and emotional progression cannot be substituted by other contributors. It signals the importance of valuing student contribution in the coproduction process.

Course Schedule and Assignments

TQM considers education as a product. To improve the product or service, it is desirable that management pay close attention to the processes of product development by measuring, monitoring, and regulating the sub-processes, so that management gets pertinent indicators for corrective action at intermediary stages. Nominal quality audits give a postmortem of the causes of product failures, which are insignificant in TQM. Hence, the successful completion of the educational product requires the students be involved as partners and co-managers in the learning process (Tribus, 1994).

Many authors (e.g., Browne & Keeley, 1981; Donovan et al., 1999; Bryce & Withers, 2003; Collis & Moonen, 2006; Turnbull, 2009) pointed out the need for transition of learning from rote learning to critical thinking. Moreover, few authors (e.g., Parks et al., 1981; Vargo & Lusch, 2004) have emphasized the application of marketing concepts of operant resources, operand resources, coproduction, beneficiary producer, and regular producer in relation to education and its stakeholders. As a result, the relationship between lecturers and students no longer will be similar to the producers and consumers of knowledge. Rather, lecturers are considered as the regular producers of knowledge as they produce it to exchange with students whereas students are considered beneficiary producers as they produce to experience the process of enhancing their skills, competencies, and knowledge out of coproduction.

The framework shown in Figure 2 assumes the importance of coproduction, wherein involvement of both the lecturers and students in the teaching and learning process is much more creative than critical evaluation and understanding of existing knowledge. The framework presents two processes: P1 and P2.

P1 assumes that the lecturer is using pedagogical tools to impart knowledge in an environment of information and communication technology. The reusable knowledge gained through the primary process and refined through cognition at the students' end will be the base knowledge for the students to contribute in the knowledge creation process of P2. In P1, students ask questions in the class, get clarifications during class discussions, seek feedback from faculty on their academic performance, etc. P1 denotes linear and successive steps in a chain of value creation.

P2 shifts the focus of learning and teaching from instructional mode to cocreation mode. The student moves slowly from

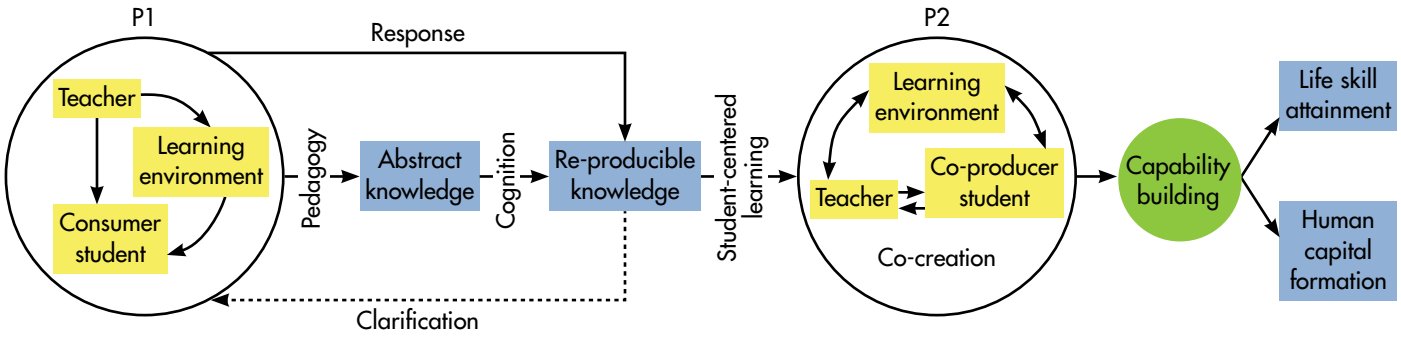

Figure 2: Coproduction Model in Education

Source: (Browne and Keeley 1981, Ostrom 1996, Vargo and Lusch 2004, Becker 2009, Horne and Shirley 2009)

a participant of the knowledge transfer chain to a producer in the coproduction network. The student should ideally be a creative thinker and contributor. The students undertake intellectual experiments with the knowledge in interaction with their peers and lecturers. They engage in preparation and presentation of content, create models under the guidance of lecturers, undertake projects integrating ideas or information from various sources, perform self- and peer evaluations of their creativity, handle community-based projects, and tutor or co-teach other students. Here value creation is more synchronized than sequential and multidimensional calling for the enriched role of students in the value creation network.

These experiments produce knowledge and capabilities, which, in turn, polish life-skill achievement for a student-co-producer meeting the requirements of the potential employers of fast-changing, technology-driven professional fields. The framework entails a transition from transmission of knowledge and participation in the learning process to creation of new knowledge and development of competency to quickly learn professional practices. However, if coproduction is not mandated in the mission of a university, coproduction behavior will be limited to mere discretionary behavior by students. Consequentially, such discretionary behaviors by students will deliver only casual and chance result on coproduction.

Demand, Contribution, and Delivery in an Exchange Process

There is a "relational exchange" of intangibles viewed from the perspectives of students and lecturers in the bi-dimensional interaction discussed earlier in this article. In this interaction, specific to a higher educational setting, if students proactively sacrifice intrinsic prices, their inputs get equitably complemented by the inputs of lecturers in the form of expert guidance and knowledge. Drawing from the economic concept of supply and demand, output is at its optimum level when there is matching demand from beneficiaries for a given supply (delivery) level of inputs from lecturers. Astin's (1970) Input-Environment-Output (I-E-O) framework describes interaction of inputs and environment on college effects. However, Austin's I-E-O framework does not split inputs in line with a supply and demand equation. The proposed coproduction framework in this article presumes a supply and demand equation. Inputs from the students (beneficiary producers) arose from their demand and inputs in the form of knowledge delivered by the lecturers (regular producers) act in complementary roles of forces of supply and demand respectively.

Delivery (Supply) of Dynamic Inputs From Lecturers

Systematically defined teaching roles can provide a durable foundation to determine inputs from lecturers. These roles define the inputs supplied (delivered) by lecturers into the coproduction process. Boyer (1991) elaborated four basic roles of a lecturer—which cover functions in the domain of scholarship of discovery, scholarship of integration, scholarship of application, and scholarship of teaching. Boyer's work looked upon the role of lecturers on their creativity. Conversely, creativity is a very crucial element in coproduction. The importance of the above-discussed roles may vary depending upon the stages of learning and development of the students. An elaborate version of the roles promulgated by Boyer (1991) is found in the "Meta Professional Framework" propounded by Arreola, Theall, and Aleamoni (2003). The above framework is built on the dimensions of content expertise (base profession skills and knowledge), instructional design skills, instructional delivery skills, and instructional assessment skills. It postulated multiple roles for the lecturer in the areas of teaching, research, and service, which call for skills and expertise beyond the content-specific domain. This framework can be used to benchmark the inputs of lecturers from the supply side of the equation.

Contribution of Inputs From Beneficiary-Students

Inputs from beneficiary-producers (students) into the process and their involvement significantly shape the quality of coproduction of knowledge and the competency gained thereof by the students. Intrinsic prices or non-monetary sacrifices are dominant among these inputs. Intrinsic price is the extent of involvement, sacrifice, or commitment desirable from the students to convert normal learning into effective coproduction. Conversely, students' choices to put forth and persist in their extra effort to learn reflect the intrinsic price. Serrat (2010) suggested four major categories of intrinsic prices: time, effort (physical and mental exercises), lifestyle, and psyche. These resources or prices are given up by students as payment (beyond money) in exchange for gaining education: self-esteem, pride, love, power, prestige, identity, self-assertion, privacy, control, freedom from fear or risk, attention in the class, etc. are dedicated generally by students in the bi-dimensional interaction of educational process.

Demand for Coproduction From Students

The demand of students can be measured and improved by specifying its determinants. Deverill (2001) has provided the concept and definition of effective demand for public service. It is one of the definitions of demand with non-economic components in its makeup.

> "Demand can be defined as an expression of desire for a particular service, measured by the contributions people are willing and able to make to receive and sustain it. In other words, it is what people want, constrained by the resources they control" (p. v).

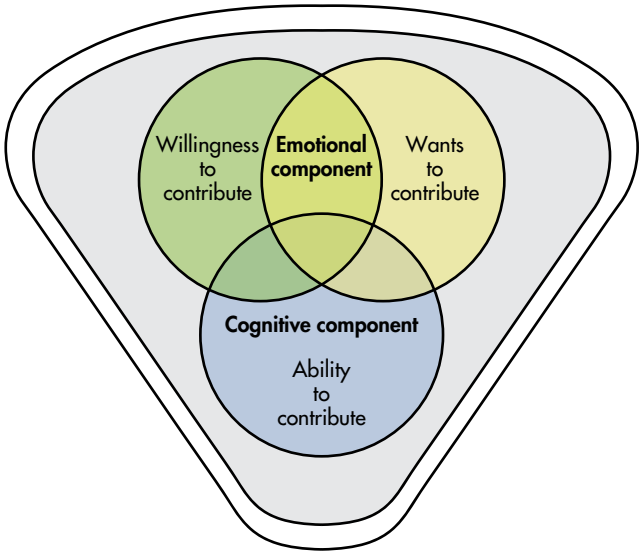

Figure 3: Effective Demand for Coproduction
Source: (Kotler,1980; Deverill, 2001; Serrat, 2010)

Kotler and Nancy (2009) explained demand in terms of readiness, willingness, and ability of a target audience to reach desired behavior. This definition also reflects emotional as well as cognitive components of effective demand. The effective demand can be analyzed with the help of a modified version of the above definition customized for coproduction in education. Figure 3 follows the definition modified by the authors of this article.

> "Effective demand for coproduction from students for education can be defined as an expression of desire by students for gaining and creating knowledge and capability, backed by their willingness and ability to contribute towards the process of coproduction so as to receive, create, and sustain quality education."

The law of demand in economics assumes interrelationships of price and non-price factors on demand. Elasticity of demand assumes that demand can be changed with deliberate changes in other determinants by the management. Conversely, drawing an anomaly from this theory of economics, if management uses social marketing tools to increase demand for coproduction of quality education, the students will prepare themselves to sacrifice high (quality) intrinsic prices. If the risk of experimenting coproduction is high, few students will be willing to spare intrinsic prices in coproduction. Hence, if a student with the ability to do an innovative technique of learning fails in an experiment, the effort should be applauded. Even failing attempts bring in something of value; the students must not feel deprived of anything intrinsically worthy.

Kotler and Nancy (2009) asserted that behavior change can be facilitated by applying effective tools of social marketing. Social marketing can condition strong positive emotions in students, which will act as a catalyst to enhance students' demand. Students will respond more from the "emotional core" of the brain— the amygdala—than from the rational part of the brain—the frontal cortex. In other words, emotional components are more significant than cognitive components in building up effective demand for coproduction. For every increase in demand due to social marketing, there is a corresponding increase in the sacrifice of intrinsic prices by the students.

Drawing insights from what Kuh (2013) referred to as institutional actions in students' learning and development, management's efforts to stimulate effective demand from students will boost the contribution of intrinsic prices from students (beneficiary inputs) in the coproduction process thereby making the delivery of quality educational services (regular inputs) by the lecturers dynamic. Such a demand should drive the students to offer non-conventional inputs using their creativity and innovation. They might bring in elements of cooperative learning such as teamwork, learning circles, modified positive perceptions, peer appraisal, self-assessment, mock teaching, formative lecturer appraisal, quicker cognition, ambitions, and peer approval to the teaching and learning process. Goodwin (2012) noted the successful impact of social marketing in India in creating enough demand for the concept of family planning. Social marketing could transform the value and behavior of couples in a positive way. Conversely, social marketing tools can enhance the demand for the concept of coproduction in education among students and increase their contributions.

Proposed Process Management Interventions

This article proposes a comprehensive philosophy of coproduction of learning built into the mission of universities of the new knowledge economy in line with the 14 points of TQM propounded by Deming. Padró (2011) emphasized the significance of managerial excellence to pursue dynamic missions of universities in the wake of an emerging knowledge economy. Effective process management interventions can secure and sustain the smooth transformation of the teaching and learning orientation from high-emphasis on absorption and instructional style transversing through participation (with critical thinking) toward coproduction.

In a coproductive value creation network of teaching and learning, student productivity is much more important than the effectiveness of lecturers. Incremental progress in the productivity of students can be measured and monitored to ensure enhanced contributions from students. While considering students and lecturers in a TQM perspective, students are external customers and lecturers are the internal customers. The task of managing students is much more complex and challenging than managing lecturers. Most of the variables lying with student cohorts and the dimensions of such variables are not easily measurable and sometimes lay in grey areas of the management. Ramirez's (1999) statement that managing ignorant variables is much more complex than managing informed variables is applicable with reference to

students and lecturers as well. Therefore, policy makers should design and administer appropriate process management interventions to transform conventional classroom behavior of students into successful coproducing behavior. Andreasen (1994) provided logical elements of social marketing approaches to influence and transform customer behavior voluntarily. Serrat (2010) reported success made in transforming behavior through social marketing citing two case studies of education and awareness campaigns. Drawing from their work, management may undertake the initiative to get the discretionary behavior of students to evolve into proffered voluntary behavior conducive for coproduction. Based on the recommendations of Andreasen (1994) and Serrat (2010), management can follow these initiatives to transform students' behavior through social marketing:

- Develop scientific tools to measure effective demand for coproduction existing among students with the help of appropriate research tools.
- Identify the gaps in actual demand and the behavior desirable for coproduction.
- Identify the level, pattern, and mode of interventions required.
- Decide on the levels of interventions at the national level or at the institutional level.
- Identify intra-learner (cognitive and emotional) determinants of demand.
- Design exclusive programs to enhance their emotional quotient (EQ) and intelligence quotient (IQ) by segmenting beneficiaries on the basis of their attributes: want, willingness, and ability.
- Appoint a program manager at the college/university level to organize (social marketing) programs to educate the students on the value of their contribution in coproduction and bring in desired changes in their behavior.
- Include a series of campaigns to reinforce the transformed behavior and reduce dissonance.

Conclusion

There is a wide gap in the behavioral approach to learning being undertaken by the students and the learning approach desirable to enhance the employability skills of graduates. It is necessary to enhance the proportion of coproduction orientation as well as its practices among students to meet the dynamic needs of the job market. Such a transition requires fundamental changes in the roles, responsibilities, and inputs of all stakeholders, especially the student-beneficiaries.

Measuring the effective demand for coproduction from students can identify the deficiencies in the desired inputs, involvements, and roles of students. Management should take the initiative to measure effective demand from students. Effective demand from students equated by effective supply from the lecturers will make the process of coproduction organically outstanding. Efforts should be made to stimulate and sustain high level of demand and to ensure predisposition of students to contribute to the process of coproduction. Such a demand is cognitive and emotional in nature rather than economic. Hence, it calls for applying process management tools and taking into consideration students' motivational and capability vacuums.

Further, sound management and marketing practices in the corporate world are founded on the basis of theories gained earlier from business schools and universities. Reciprocally, universities and business schools can draw from the service-centered dominant logic of marketing and its allied domains of coproduction and social marketing to polish their best practices in teaching and learning. Universities can sustain leadership and transform culture of student engagement into coproduction, if such integrations target faster human development and maintenance of high quality human capital stock for ready supply to corporate needs.

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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

Lisa M. Walters

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

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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 become 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, QualtricsTM, 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

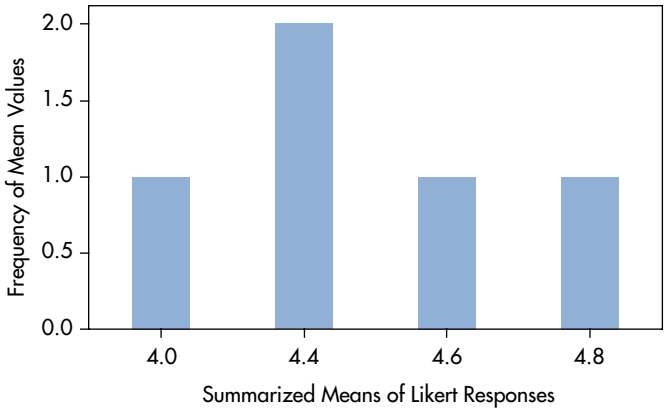

Figure 1: Student Perceived Understanding of Quality Practices. Summarized Means of Likert Responses to Survey Questions 1-5 From Table 1

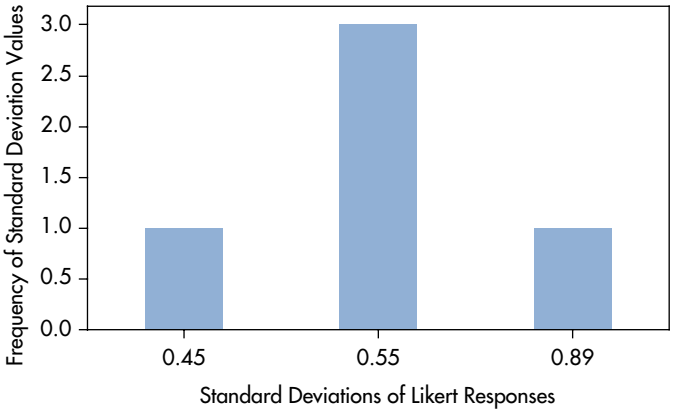

Figure 2: Student Perceived Understanding of Quality Practices. Summarized Standard Deviations of Likert Responses to Survey Questions 1-5 From Table 1

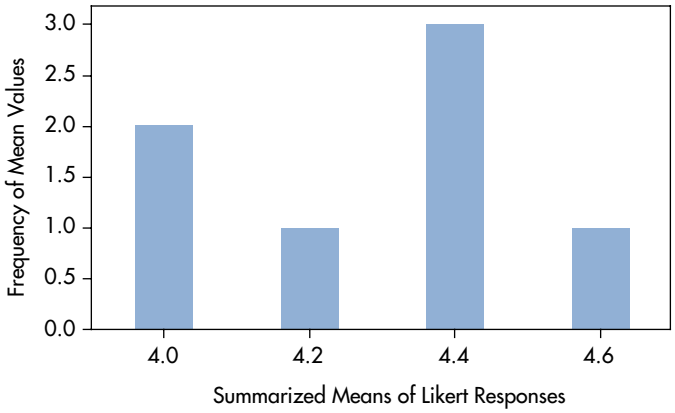

Figure 3: Students' Anticipated Future Orientation Toward Quality Practices. Summarized Means of Likert Responses to Survey Questions 6-12 From Table 1

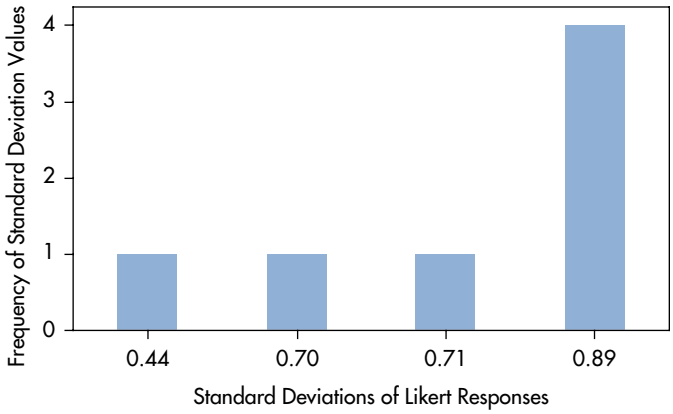

Figure 4: Students' Anticipated Future Orientation Toward Quality Practices. Summarized Standard Deviations of Likert Responses to Survey Questions 6-12 From Table 1

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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Quality Approaches in Higher Education

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The American Society for Quality's Education Division publishes the online, double-blind, peer-reviewed journal *Quality Approaches in Higher Education*. The editorial team actively encourages authors to submit papers for upcoming issues.

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- Case studies or research studies specific to collaboration with industry on STEM education through internships, co-ops, and capstone experiences for providing experiential and deep learning experiences and preparing students for STEM careers.
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