Quality Approaches in Education

IN THIS ISSUE:

The Journal That Connects Quality and Education

Education Division
The Global Voice of Quality®

@asq.org/edu

Quality Approaches in Education

Note From the Editor

Elizabeth A. Cudney

Throughout the past year, the Education Division conducted an extensive review of its products and services. As a result of this analysis, the Education Division leadership team agreed to expand the focus of the journal from a sole emphasis on higher education to now also include K-12 and workforce development. With this change, the *Quality Approaches in Higher Education* (*QAHE*) journal has transitioned to the *Quality Approaches in Education* (*QAE*) journal. It is our pleasure to release the first issue under the new name, *Quality Approaches in Education*.

Elizabeth A. Cudney

As part of this transition, we look forward to sharing how quality tools, methods, and approaches can be applied in K-12, higher education, and workforce development for the benefit of students, faculty, the workforce, and the educational community. We believe that sharing best practices across multiple segments will be beneficial to our readers. In addition, the change will enable an increase in the number of issues starting in 2017, which will also increase the journal's visibility and value to the Education Division membership. The main purpose of *QAE* is to engage the education community in topics related to improving quality, identifying best practices, and expanding the literature specific to quality in 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, which will benefit the entire Education Division membership.

This issue is comprised of four articles that illustrate the breadth of quality applications in education. The first article, by Emily Messa, addresses employee performance and customer service in higher education. In particular, the employee performance appraisal process was analyzed to understand how employee customer service is valued and determine which characteristics serve as predictors of employee customer service. The next article by Emily Shamash and Alyson Martin studies co-teaching in pre-service teacher education. The co-teaching technique is utilized to better prepare future educators for working with students with disabilities and their families. The approach was linked to the course objectives, and the learning outcomes were evaluated through a student survey. The third article by Amruta Kulkarni and Jamison Kovach focuses on an effort to employ Lean Six Sigma to improve scheduling in an academic environment. The Define, Measure, Analyze, Improve, and Control (DMAIC) methodology was used to reduce the time to schedule a room for a special event, meeting, or other function. The article illustrates the importance of using continuous improvement techniques for university operations. The final article by Grace Brannan discusses quality improvement education for medical trainees. An historical perspective, including landmark publications, provides the motivation to prepare medical trainees to apply continuous improvement tools and techniques. Brannan recommends standardizing continuous improvement training to reduce variability. These articles illustrate how quality approaches can be used in all facets of education to measure customer service, prepare educators and trainees, and improve processes.

I would also like to take this opportunity to thank the Associate Editors and the Education Division for their support in making this a smooth transition. We look forward to growing the literature on K-12, higher education, and workforce development.

Elizabeth 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 ASEM Fellow. In 2013, Cudney was elected as an ASQ Fellow. She was inducted into the ASQ 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 six books and more than 55 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.*

Best Paper Award

Beginning in 2013, the *Quality Approaches in Education* editors will announce an annual best paper award to the author(s) of a paper published in *Quality Approaches in 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 education. There is no nomination form for this award.

Visit our website at asq.org/edu/quality-information/journals/ today!

Education Division
ASQ The Global Voice of Quality®

Quality Approaches in Education

2016 QUALITY EDUCATION CONFERENCE & WORKSHOP
NOVEMBER 11 – 13, 2016 | HOUSTON, TEXAS

Theme:

Evolving the Educational Experience

The education process begins early in life and continues through all phases of our lives as we set out to learn and experience new and exciting ventures. The foundation of this year's conference centers on the continually evolving needs for education in all areas and on the need for promoting continuous improvement and innovative ideas to enhance the educational experience. The 2016 conference covers a large range of ideas and is geared to provide attendees with new concepts that can be implemented to boost improvement in education and education processes.

Focus areas:

The Role of Technology in Education
- Distance Learning
- Games and Simulation
- Partnerships with Science Centers and Museums

STEM Focus Areas
- Enhancing the STEM Agenda
- Preparing Pre-school and K-12 for STEM
- The Leadership Role of Corporations and Hospitals

Quality Management Systems to Improve Processes
- ISO 9001
- Baldrige Award Criteria

Enhancing the Education Experience Through Innovation
- Blended Classroom
- Community Collaboration
- Classroom Response Systems (Clickers)
- Improving Healthcare Outcomes by Applying New Educational Methods

Education and Engaging for Lifelong Learning
- Engaging Non-traditional Students
- Enhancing Class Participation
- The University Experience as a Whole

Join us for our 1.5-day conference and half-day pre-conference workshops in Houston, Texas and celebrate World Quality Month with us this November!

Meet our Keynote Speakers:

William J. Troy
ASQ Chief Executive Officer Milwaukee, WI

Dr. John Dew
Senior Vice Chancellor for Student Services and Administration Troy University, Troy, AL

Dr. Jay Marino
Superintendent, Antioch School District 34, Chicago, IL

Dr. Terri T. Showers
STEM Educator Columbia, MD

Participants may make their hotel reservations at The Westin Houston on line at http://bit.ly/2alyWJP Use code "2016 QECW" when making your reservation (One King or Two Double Beds - $110 USD/night).

Watch for our registration site opening announcement!

Early Bird Conference Registration Rates

Non-Member	ASQ Member	Group (five or more)	Full-Time Student
$445	$345	$295	$95

Visit our Division website for announcements (asq.org/edu) and connect with us online for conference updates and registration details!
Join our LinkedIn Group: www.linkedin.com/groups/8362583

Education Division
The Global Voice of Quality®
ASQ
asq.org/edu

Implementation of an employee performance appraisal instrument in higher education to measure employee customer service

Finding Meaning in the Measure: A Case Study to Understand the Value of Employee Performance and Customer Service Evaluation in Higher Education

Emily A. Messa

Abstract

This study analyzed the employee performance appraisal process at a post-secondary institution to understand what was being measured using this corporate tool. Two research questions were included: What is actually being measured in this institution's employee performance appraisal? and How is employee customer service valued at one institution, and are there characteristics that serve as predictors of employee customer focus? Two principal components analyses were conducted on a sample (N=2,401) of employees. The results included one factor with eigenvalues greater than 1.00, accounting for 75.74% of the variance in non-managers and 74.17% in managers. A multiple linear regression model was conducted on non-manager employees (N=1,836) to understand the value of employee customer service. The prediction model was significant, $F(16, 1826)=24.27$, $p<0.001$, accounting for 0.17 of variance ($R^2=0.18$, adjusted $R^2=0.17$). A customer-focus score was predicted by college or department function, years employed, and ethnicity.

Keywords

Human Resources, Quality Tools, Continuous Improvement

Introduction

Higher education has a long history of adopting management tools from other environments and overlaying them indiscriminately onto these institutions (Birnbaum, 2000). Some examples of management processes that have been implemented and later abandoned in higher education include strategic planning and total quality management (Birnbaum, 2000; Chaffee, 1998). While these processes may have faded from popular use in higher education, earning the moniker of management fads, Birnbaum (2000) and Chaffee (1998) argue that their effects can be long-lasting.

Importantly, it is noteworthy that the higher education culture is different from the corporate sector, which means that some tools may not work the same way in higher education as they do in the business world (Birnbaum, 2000). Universities are described as loosely connected systems in which individual departments and colleges have independence and autonomy from the larger system, thus creating their own micro-cultures (Birnbaum, 1988; Birnbaum, 2000; Gilmore, Hirschhorn, & Kelly, 1999; Orton & Weick, 1990). As discussed by Birnbaum (2000) and Giroux (2002), there is concern that widespread corporate influences on the higher education culture will continue to move higher education further away from its core mission. Birnbaum (2000) and Chaffee (1998) are somewhat optimistic about these influences, believing that even if these corporate tools fail, they do make a difference by enhancing management in higher education. Their implementations force conversations about institutional principles, bring people together in the organization who might not otherwise interact, and provide opportunities to review institutional processes in new ways (Birnbaum, 2000).

This case study analyzed a university's implementation of one such corporate tool, the employee performance appraisal, to understand how corporate processes have been used in higher education and what this instrument measured. This university's performance appraisal included a measure of employee customer service, a term typically applied in the corporate sector. An additional study goal was to understand how this university measured customer service. As Birnbaum (2000) noted, there has been little empirical study of the effects of management tools and their implementation in higher education settings.

These goals reflect Birnbaum's (2000) concern that when implementing management tools, an obsession with measurement can take root in the organization. The components that are measured are believed to be better because there is a quantitative value associated with them (Birnbaum, 2000). This study follows Birnbaum's (2000) argument that these tools are often implemented and valued because they produce quantitative results, which make them seem to be valid measures by university leadership. However, as findings from this study illustrate, even after these tools are implemented, leadership may be unaware of what the tools are actually measuring. Hypotheses guiding this study included that the appraisal may not be measuring the desired components of non-faculty employee performance and, similar to studies in the corporate literature, certain predictors, such as race, may influence an employee's customer-service score. The specific research questions guiding this study included: What is actually being measured in this institution's employee performance appraisal? and How is employee customer service valued at one institution, and are there characteristics that serve as predictors of employee customer focus?

Background of the University's Employee Performance Appraisal

This university launched a centralized, electronic performance appraisal in 2010 to measure all non-faculty employees. The appraisal was divided into four sections: job goals, job responsibilities, customer focus, and competencies. (Human Resources, n.d.a). Managers were rated on a fifth category, manager responsibilities (Human Resources, n.d.a.). This electronic appraisal was housed in a web-based human resource management system (Human Resources, n.d.a.).

Sections of the University's Employee Performance Appraisal

There were four sections in the performance appraisal for non-supervisory employees and five sections for supervisory employees. Employees were rated on each section using a scale from one to five, with one being the lowest. Each section score

was averaged to calculate a score for each employee, which became the employee's performance rating.

Goals were described as objectives, established annually between the employee and supervisor, and employee job responsibilities were individual duties associated with each job and assigned by human resources (Human Resources, n.d.a). Competencies were desired behaviors identified by the university for a particular employee type and were pre-loaded into the appraisal (Human Resources, n.d.b.). According to the university's process (Human Resources, n.d.a.) for evaluating customer focus, supervisors were to devise behaviors that demonstrated excellent customer service and rate employees on their performance.

Each section was pre-assigned a minimum weight by the university that was pre-loaded into the appraisal. For example, the minimum weight for the job goals section was 10%, and the minimum for customer focus was 10% (Human Resources, n.d.c.). The minimum weight for job responsibilities was 40%, and the minimum weight for competencies was 10% (Human Resources, n.d.c.). Supervisors were able to adjust weightings, as long as the weight for the overall appraisal equaled 100% (Human Resources, n.d.c.). Section ratings were combined into an employee's rating number, which became the employee's performance appraisal score (Human Resources, n.d.a.). The average weightings selected by supervisors for each section of the appraisal are shown in Table 1 and contrasted with the minimum section requirement.

Table 1: Average Weightings Selected by Each Supervisor for Appraisal Sections

Component Name	Avg. % Weighing	Minimum % Required
Job Responsibilities	47	40
Job Goals	20	10
Competency	17	10
Customer Service	13	10
Manager Responsibilities	15	(not indicated)

Review of Literature

To understand this study's framework, it is important to be familiar with prior research on the employee performance appraisal, problems identified by researchers with the performance appraisal, differences between customer service from corporate and higher education perspectives, and gaps in the current literature.

Overview of the Employee Performance Appraisal

The employee performance appraisal is a process conducted regularly, and employees are rated on strengths and weaknesses (Cleveland, Murphy, & Williams, 1989, Kondrasuk, 2011; Lunenberg, 2012; Moussavi & Ashbaugh, 1995; Spence & Keeping, 2011). Some researchers have described the performance appraisal as one of the most disliked workplace functions because supervisors do not like providing negative feedback to employees, and employees dislike hearing negative information about their performance (Kondrasuk, 2011; Spence & Keeping, 2011; Thomas & Bretz, Jr., 1994). The performance appraisal may be a one-time activity in some work settings, and in other organizations it may represent a broad category used to describe multiple activities used by the organization to evaluate and develop employees (Fletcher, 2001).

Challenges Identified by Researchers With the Employee Performance Appraisal

A number of problems with performance appraisal processes have been documented. For example, McIntyre and James (1995) found employee characteristics may influence how raters consider and combine performance information. Also, DeNisi (1992) pointed out that raters will find a way to influence any performance system that is implemented to achieve a desired outcome. Likewise, Catano, Darr, and Campbell (2007) found high intercorrelations between eight competencies used in one performance-appraisal system, which led these researchers to question whether raters are able to distinguish between different competencies in the performance appraisal. Similarly, Ogunfowora, Bourdage, and Lee (2010) found that rater personality influenced the importance the rater placed on certain performance characteristics. For example, raters with high openness attached more weight to behaviors associated with adaptive performance when scoring the performance appraisal (Ogunfowora et al., 2010).

Differences Between Customer Service in the Corporate Sector and Higher Education

There appears to be limited research on the measurement of employee customer service in higher education, in part, because one of the challenges is defining it. Scott (1999) described that students are only one of the university's customers. The long list of university customers includes parents, humanity, government, and agencies that fund research (Scott, 1999). Svensson and Wood (2007) argued that students are not customers but citizens of the university community. According to Svensson and Wood (2007), students believe that they are customers because of the way they are treated by the institutions, including being asked for feedback about university services. Students have responded by applying their traditional market model to their university experiences and believe that they are obligated to complain when service perceptions do not match expectations (Svensson & Wood, 2007).

Some believe that the connections forged in a university community between employee and student are more complex than in the corporate sector (Chaffee, 1988; Pitman, 2000). While the customer in the corporate literature has been identified as the individual who uses the product or service, this distinction is not as clear in higher education. For example, in Pitman's (2000) study at an Australian university, participating employees described a much deeper connection with students than they believed is illustrated by the term customer.

Gaps in the Current Literature

This study examined how two uniquely corporate tools – performance appraisal and the measurement of customer service – have influenced this particular institution and its performance culture. This quantitative case study fills a critical void in the higher education literature by analyzing how one university implemented the corporate employee performance tool to measure its non-faculty employees. This study's intent is to illustrate potential long-lasting impacts these processes may leave on the culture in the higher education workplace. As non-faculty, full-time employees account for approximately 800,000 members of the employee workforce at four-year public universities (Knapp, Kelly-Reid, & Ginder, 2012), understanding the effects of the performance appraisal will be of interest to many leaders in higher education.

Method

The study setting and participants, variables used to answer the research questions, and statistical processes used will be presented in the subsequent sub-sections.

Setting and Participants

The study setting was a large, urban research university in the southwestern region of the United States. Data from this study comes from a larger study that looked at competency selection for non-faculty employees at one post-secondary institution (Messa, Horn, Longacre, Olenchak, & Penney, 2016). Total participants were 2,401 non-faculty employees, who were administered a performance appraisal in the 2012 calendar year. These employees comprised a variety of professions at the university and were employed in 29 colleges and departments. This sample was selected as complete data for all employees available for one institution. The breakdown of participants is presented in Table 2.

Table 2: Breakdown of Participants (N=2,401)

Variable Name	Group	Number of Employees		% of Employees	
		Manager	Non-Manager	Manager	Non-Manager
Gender	Female	338	1,104	59.8	60.1
	Male	227	732	40.2	39.9
Ethnicity	American Indian	2	4	0.40	0.20
	Asian	50	264	8.8	14.4
	Black	101	494	17.9	26.9
	Hispanic	86	457	15.2	24.9
	Pacific Islander	1	2	0.2	0.10
	White	325	615	57.5	33.5
Highest education	Not indicated	6	51	1.06	2.8
	Less than Bachelor's	146	924	25.8	50.3
	Bachelor's	184	459	32.6	25.0
	Greater than Bachelor's	229	402	40.5	21.9
Years of service	Less than 5	132	550	24.4	30
	5-10	125	546	21.1	29.7
	11-15	116	337	20.5	18.4
	16-20	81	179	14.3	9.7
	21-25	53	111	9.4	6.0
	26+	58	113	9.7	6.2
Age	21-30	27	237	4.8	12.9
	31-40	129	467	22.8	25.4
	41-50	161	432	28.5	23.5
	51-60	158	476	28.0	25.9
	61-70	85	205	15.0	11.2
	71+	5	19	0.9	1.0

Variables and Statistical Processes Used to Answer Research Question One

The first research question was: What is being measured in this institution's performance appraisal? Independent variables used in the analysis were each employee's score on the performance appraisal sections: job goals, job responsibilities, customer focus, and competencies (Human Resources, n.d.a).

For supervisory employees, who were rated on a fifth section, the score on the manager responsibilities, was also an independent variable (Human Resources, n.d.a). The selection variable was an employee's overall score on the appraisal, which was the average score across all sections.

Two principal components analyses were performed to understand the relationship between the appraisal sections and

the employee's overall appraisal score. One principal components analysis was performed using non-manager employee data, and a separate principal components analysis was conducted using manager employee data. A Kaiser-Meyer-Olkin measure of sampling adequacy was reported to ensure data were suitable for principal component analysis. Similarly, a Bartlett's Test of Sphericity was conducted to ensure significance (p<0.001), indicating sufficient correlation between variables to proceed with the analysis. In the study findings, eigenvalues greater than 1.00 and their cumulative variance were reported.

Variables and Statistical Processes Used to Answer Research Question Two

Research question two was: How is the measurement of employee customer service in higher education valued, and are there individual and college/division differences in the evaluation of employee customer service? Customer service was operationalized using the employee's customer-focus score in the performance appraisal. Multiple linear regression was used to understand the relationships between predictors and the dependent variable of the customer focus section.

Independent variables included: employee gender, employee ethnicity, years of service, employee score on the top-five employee competencies, number of employees in each college and division, and employee's highest education. Likewise, a dummy-coded variable was used to identify the function of each college or department, using coding from the National Association of College and University Business Officers (NACUBO). For example, colleges were assigned to the NACUBO function of instruction. Also, the physical plant and public safety departments were assigned to the NACUBO category of plant. Administrative units at the institution, such as human resources, were assigned to the NACUBO category of institutional support. The top-five employee competencies were determined by using the competencies most frequently selected to rate employees or those competencies with the least number of missing ratings. Variables used in the regression model are presented in Table 3. The dependent variable was the employee's overall score on the customer focus section.

Research Question One Findings

A principal components analysis was completed for the four sections of the university's performance appraisal using a sample of 1,836 non-manager, non-faculty employees. Because of the large sample size, the variables-to-sample-cases ratio was deemed adequate. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.83, indicating the present data were suitable for analysis. Similarly, Bartlett's Test of Sphericity approximate chi-square of

Table 3: Independent Variables Used in the Regression

Categorical Variables	Quantitative Variables
1. Employee gender (as indicated by a dummy coded variable; 1 for female; 0 for male)	Employee years of service
2. Employee ethnicity (as indicated by a dummy coded variable; 1 for White; 0 for all other ethnicities)	1. Number of employees by college level
	2. Employee competency rating – adaptability
3. Employee highest degree attained	3. Employee competency rating – communication
4. College/department of employment (as indicated by dummy coded variables; reference variable was public service)	4. Employee competency rating – knowledge and skills
	5. Employee competency rating – quality orientation
	6. Employee competency rating – initiating action

4,474.552 was significant (p<0.001), indicating sufficient correlation between the variables to proceed with the analysis.

One factor had eigenvalues greater than 1.00, cumulatively accounting for 75.74% of the total variance. Because there was only one factor with an eigenvalue greater than 1.00, it was not appropriate to rotate these variables. In the component matrix, all appraisal sections had absolute value loadings greater than 0.800. The four variables represented the construct "employee proficiency." The highest loading was for the competencies section, with a loading of 0.914, and the variable with the lowest loading across all non-supervisory employees was the customer focus section, with a loading of 0.814. This single factor solution had good reliability, as $\alpha=0.885$. Loadings across all non-supervisory employees are provided in Table 4.

Likewise, a principal components analysis of five sections of the university's appraisal was conducted using performance appraisal data from 565 supervisory, non-faculty employees. Because of the large sample size, the variables-to-sample-cases ratio was deemed adequate. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.88, indicating the present data were suitable for analysis. Similarly, Bartlett's Test of Sphericity approximate chi-square of 2,063.015 was significant (p<0.001), indicating sufficient correlation between the variables to proceed with the analysis.

One factor had eigenvalues greater than 1.00, cumulatively accounting for 74.17% of the total variance. Because there was only one factor with an eigenvalue greater than 1.00, it was not appropriate to rotate these variables. In the component matrix, all sections had absolute value loadings greater than 0.731. The five sections represented "supervisor proficiency." The highest loading was for the competencies section, with a loading of 0.934; and the lowest loading was for the customer focus section, with a loading of 0.731. This single-factor solution had good reliability, as $\alpha=0.905$. Loadings across all manager staff are provided in Table 4.

Research Question Two Findings

Gender, race, years of service, education, department and college type, and the top-five competencies that were utilized to rate 1,836 non-supervisory employees were evaluated using a standard multiple linear regression analysis to determine potential predictors of employee customer service score. The prediction model was statistically significant, $F_{(16, 1826)}=24.27$, $p<0.001$, and accounted for approximately 17% of the total variance of an employee's score on the customer focus section ($R^2=0.18$, Adjusted $R^2=0.17$). An employee's score on this section was mainly predicted by whether the employee worked in a college or department that performed the primary functions of instruction, research, academic support, institutional support, student services, or auxiliaries. An employee's score on the customer focus section was also primarily predicted by years of service to the institution, and to a lesser extent, ethnicity. The raw and standardized regression coefficients, together with their correlations with employee customer-focus score, their squared semi-partial correlations, and their structure coefficients, are shown in Table 5.

Discussion

In this section, study findings are discussed in greater detail along with recommendations for policy and practice for each research question. Additionally, this section will briefly outline study limitations and offers a conclusion that discusses the significance of this study for the implementation of corporate tools in higher education.

Table 4: Appraisal Section Loadings

Appraisal Section	Loadings across all non-supervisory employees	Loadings across all supervisory employees
Competencies	0.914	0.934
Job Responsibilities	0.906	0.916
Job Goals	0.843	0.866
Manager Responsibilities		0.845
Customer Focus	0.814	0.731

Table 5: Customer Service Regression Results

Model	B	SE-b	Beta	Pearson r	sr^2	Structure Coefficient
Constant	2.79	0.11				
Female	0.03	0.03	0.22	0.06	0.00	0.14
White*	0.10	0.04	0.06	0.12	0.00	0.29
Years of service*	0.00	0.00	0.04	0.06	0.00	0.14
Education	-0.01	0.04	0.06	-0.16	0.00	-0.38
Instruction*	0.66	0.10	0.43	0.26	0.02	0.62
Research*	0.64	0.12	0.19	0.06	0.01	0.14
Academic support*	0.45	0.11	0.15	0.00	0.01	0.00
Institutional support*	0.49	0.10	0.23	0.04	0.01	0.95
Plant	0.07	0.12	0.04	-0.31	0.00	-0.74
Student services*	0.34	0.12	0.15	-0.30	0.00	-0.72
Auxiliaries*	0.40	0.12	0.11	-0.02	0.01	-0.05
Number of employees	0.00	0.00	0.02	-0.20	0.00	-0.48
Adaptability	0.01	0.01	0.06	0.25	0.00	0.60
Communication	0.10	0.02	0.01	0.13	0.00	0.31
Initiating action*	0.02	0.01	0.04	0.27	0.00	0.65
Knowledge and skills	0.01	0.01	0.05	0.21	0.00	0.50
Quality orientation	-0.01	0.01	-0.03	0.20	0.00	0.48

N=1,836; *p<0.05

Note: The dependent variable was the employee customer-focus score. $R^2=0.18$. Adjusted $R^2=0.17$. sr^2 is the squared semi-partial correlation.

Discussion of Findings
Related to Research Question One

The four appraisal sections for non-supervisory employees (customer focus, job goals, job responsibilities, and competencies) and five appraisal sections for supervisory employees (customer focus, job goals, job responsibilities, supervisor responsibilities, and competencies) appeared to rate employees on "employee proficiency" or "supervisor proficiency" and not four or five separate performance components. The usage of four or five sections, each with separate definitions, indicated that the university appeared to be interested in measuring four distinct constructs. Even though all loadings across the sections were relatively high, the competency section had the highest loading.

While the university may be well-intentioned in establishing as many as five sections to measure employee performance for manager and non-manager employees, findings from the principal components analyses illustrated that these sections do not add value. Future study of the phenomenon should probe deeper into why the appraisal is only measuring one construct. Recommendations for this inquiry include conducting interviews with supervisors about the cognitive processes that supervisors have been using to rate their employees in each section. These insights can help the university refine its instructions to supervisors and result in developing guides for each section, if the university and its supervisors deem these sections a useful tool to help non-faculty employees improve their performance. This finding mirrors Birnbaum's (2000) concern that just because something can be measured does not mean that it adds value. Additionally, this also reflects Chaffee (1998) and Birnbaum's (2000) optimism that when implementing management tools, the university has a valuable opportunity to examine its organizational principles.

Discussion of Findings
Related to Research Question Two

This study found that employment in certain colleges and departments was a small but significant predictor of employee customer-focus score, except for those employed in departments classified with the NACUBO function code plant or employees who work in the facilities, safety, and security departments. An employee's score on the customer focus section was predicted by years of service to the institution, and to a lesser extent, ethnicity, or whether the employee's ethnicity was White.

Only one of the five competencies, initiating action, was a significant predictor of employee customer-focus score. For every additional point on the competency of initiating action, there was a 0.02 predicted gain on an employee's customer-focus score.

Since initiating action predicted employee customer-focus score, it is important to ask supervisors to provide behaviors that they believe represent this competency and if there are other competencies they believe are indicative of customer service. This may help the university to develop its definition of customer and also serve as an instrument that can guide non-faculty employee customer service training.

Since there was a predicted gain of 0.10 for White employees on their employee customer-focus score, it is important that the university seek to understand more about the implicit bias that supervisors appear to exhibit when rating employees in this appraisal section. Implicit bias is defined as an unconscious perspective that impacts individual actions and decision making (Kirwan Institute for the Study of Race and Ethnicity, 2015). This bias is so innate that most people are shocked when it is demonstrated they have exhibited it (Jolls & Sunstein, 2006). A recent study provided a potential solution to reduce implicit bias in the higher education workplace. Devine, Forscher, Austin, and Cox (2012) found that education about implicit bias and strategies to diminish it, such as increasing positive encounters among members of different racial and ethnic groups, created long-term reductions in implicit bias among a treatment group. The treatment group also reported becoming more aware of discrimination (Devine et al., 2012).

This finding of potential racial bias is not unique to the evaluation of customer service in higher education employees. In a study that analyzed customer service evaluations of restaurant employees, Lynn and Sturman (2011) found that customers tended to express a preference for their own racial group when evaluating these employees on certain aspects of customer service performance. This finding does point out that continued assessment is important. A future study of the university's appraisal process should analyze whether this apparent implicit bias has permeated supervisor ratings on other components of the appraisal. Likewise, a longitudinal study of the university's appraisal process should be conducted to understand whether there have been any long-term impacts of this potential bias on minority promotion and diversity, as both Chaffee (1998) and Birnbaum (2000) noted effects of corporate tools on the institutional culture can be long-lasting.

Limitations

This was a case study of one institution; therefore, one limitation is that these findings may not be generalizable to similar institution types. Similarly, the study was limited by the institution's own processes. Due to these institutional processes, high loadings on one factor in the principal components analyses

meant that terminology referencing high and low loadings should be considered relative to this finding.

Conclusion

This study adds to the current literature on the implementation of corporate tools in higher education settings by using a case study approach to understand how one such tool, the performance appraisal, was implemented at one university. These corporate processes are often implemented in higher education without understanding how they affect the organizational culture (Birnbaum, 2000). It is important for other universities to be mindful of how they implement corporate tools and the need for institutions to study how they are used and the effects of their implementation. Other universities should be mindful of this and use the approaches in this study to measure the value of these corporate tools on the organizational culture of their institutions.

References:

Birnbaum, R. (1988). *How colleges work: The cybernetics of academic organization and leadership*. San Francisco: Jossey-Bass.

Birnbaum, R. (2000). The life cycle of academic management fads. *Journal of Higher Education, 71*(1), 1-16.

Catano, V. M., Darr, W., & Campbell, C. A. (2007). Performance appraisal of behavior-based competencies: A reliable and valid procedure. *Personnel Psychology, 60*(1), 201-230.

Chaffee, E. E. (1998). Listening to the people we serve. In W. G. Tierney (Ed.), *The responsive university: Restructuring for high performance* (pp.13-37). Baltimore: Johns Hopkins University Press.

Cleveland, J. N., Murphy, K. R., & Williams, R. E. (1989). Multiple uses of performance appraisal: Prevalence and correlates, *Journal of Applied Psychology, 74*(1), 130-135.

DeNisi, A. S. (1992). Why analytic approaches to performance appraisal cannot work. *Human Resources Management Review, 2*(1), 71-80.

Devine, P. G., Forscher, P. S., Austin, A. J., & Cox, W. T. L. (2012). Long-term reduction in implicit race bias: A prejudice habit-breaking intervention. *Journal of Experimental Social Psychology, 48*(6), 1267-1278.

Fletcher, C. (2001). Performance appraisal and management: The developing research agenda. *Journal of Occupational and Organizational Psychology, 74*(4), 473-487.

Gilmore, T. N., Hirschhorn, L., & Kelly, M. (1999). Challenges of Leading and Planning in Higher Education. *Philadelphia: CFAR, Working Paper.*

Giroux, H. A. (2002). Neoliberalism, corporate culture, and the promise of higher education: The University as a democratic public sphere. *Harvard Educational Review, 72*(4), 425-464.

Human Resources. (n.d.a.). ePerformance FAQs. Link available upon request from author.

Human Resources. (n.d.b.). ePerformance Competencies. Link available upon request from author.

Human Resources (n.d.c.) ePerformance Review Process - Staff. Link available upon request from author.

Jolls, C., & Sunstein, C. R. (2006). The law of implicit bias. *California Law Review, 94*(4), 969-996.

Kirwan Institute for the Study of Race and Ethnicity. (2015). Understanding implicit bias. Retrieved from http://kirwaninstitute.osu.edu/research/understanding-implicit-bias/.

Kondrasuk, J. N. (2011). So what would an ideal performance appraisal look like? *The Journal of Applied Business and Economics, 12*(1), 57-71.

Knapp, L. G., Kelly-Reid, J. E., & Ginder, S. A. (2012). Employees in Postsecondary Institutions, Fall 2011 and Student Financial Aid, Academic Year 2010-11: First Look (Provisional Data) (NCES 2012-156rev). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved 07/02/15 from http://nces.ed.gov/pubsearch.

Lunenberg, F. C. (2012). Performance appraisal: Methods and rating errors. *International Journal of Scholarly Academic Intellectual Diversity, 14*(1), 1-9.

Lynn, M., & Sturman, M. (2011). Is the customer always right? The potential for racial bias in customer evaluations of employee performance. *Journal of Applied Social Psychology, 41*(9), 2312-2324.

McIntyre, M. D., & James, L. R. (1995). The inconsistency with which raters weight and combine information across targets. *Human Performance, 8*(2), 95-111.

Messa, E. A., Horn, C. L., Longacre, T., Olenchak, F. R., & Penney, L. M. (2016). A case for competencies: Assessing the value of trait-based performance appraisal for non-faculty university employees. Education Policy Analysis Archives, *24*(51).

Moussavi, F., & Ashbaugh, D. L. (1995). The effects of participative, goal-oriented performance appraisal: A field study in public agencies. *Journal of Public Administration Research and Theory, 5*(3), 331-343.

Ogunfowora, B., Bourdage, J., & Lee, K. (2010). Rater personality and performance dimension weighting in making overall performance judgments. *Journal of Business Psychology, 25*(3), 465-476.

Pitman, T. (2000). Perceptions of academics and students as customers of administrative staff in higher education. *Journal of Higher Education Policy and Management, 22*(2), 165-175.

Orton, J. D., & Weick, K. E. (1990). Loosely coupled systems: A reconceptualization. *Academy of management review, 15*(2), 203-223.

Scott, S. V. (1999). The academic as service provider: Is the customer 'always right?' *Journal of Higher Education Policy and Management, 21*(2), 193-202.

Spence, J. R., & Keeping, L. (2011). Conscious rating distortion in performance appraisal: A review, commentary, and proposed framework for research. *Human Resources Management Review, 21*(2), 85-95.

Svensson, G., & Wood, G. (2007). Are university students really customers? When illusion may lead to delusion for all! *International Journal of Education Management, 21*(1), 17-28.

Thomas, S. L., & Bretz, R.D., Jr. (1994). Research and practice in performance appraisal: Evaluating employee performance in America's largest companies. *S.A.M. Advanced Management Journal, 59*(2), 28.

Emily A. Messa, Ph.D.

Emily A. Messa, Ph.D. *is the associate vice president for administration at the University of Houston and associate vice chancellor for administration for the University of Houston System. Her research interests include understanding the effects of higher education policy and management innovations on the culture, organization, and individuals within the workplace at post-secondary institutions. Messa has been employed by the University of Houston for 17 years in a variety of administrative capacities and obtained her doctorate in educational psychology and individual differences from the University of Houston in May 2015. Correspondence about this article can be directed to messa.emily@gmail.com.*

Employing co-teaching techniques in a practicum course to better prepare educators to work with students with disabilities and their families

Walking the Walk: Co-Teaching and Collaboration in the Pre-Service Teacher Education College Classroom

Emily R. Shamash and Alyson M. Martin

Abstract

Special and general education teachers need to understand, practice, and implement the foundations of co-teaching in today's classroom. It is both valuable and logical that they have the experience of being students within a co-taught model in their college or university teacher training programs. The purpose of this article is to discuss the process and model used for co-teaching in a graduate-level practicum course at Teachers College, Columbia University, for pre-service special educators. The model is a co-taught course called *Working with Families of Students with Disabilities*, which combined two sections of the same course. Preliminary quantitative and qualitative data on the graduate-student experience in this co-taught course is discussed.

Introduction

Co-teaching is defined as two or more professionals who deliver substantive instruction to a diverse group of students in a common space (Cook & Friend, 1995). Typically, the two instructors include a general educator and a special educator, but any specialist from a related field could partner with the general educator in the co-taught classroom. These educators need to be actively involved in planning and implementing the instruction for the class while working with a diverse group of students. There are numerous models that can be applied to co-teaching, including: one teach-one assist, station teaching, parallel teaching, alternative teaching, and team teaching (Cook & Friend, 1995). Limited research exists on the implementation of these co-teaching models in higher education. While additional studies on co-teaching in higher education that address the impact on student learning are needed, preliminary work has been reported in the literature. Harris and Harvey (2000) found that co-facilitating a college-level course provided them with an opportunity to co-plan and co-lead, and offer two professional perspectives to students. They found that their time invested in effectively collaborating resulted in a model of a diversified experience for students (Harris & Harvey, 2000). Additionally, Marshall (2014) found that co-teaching in practicum courses helped to bridge the gap between theory and practice (Marshall, 2014).

It is more essential than ever for pre-service special and general educators to be well-versed in the practice, values, and models of co-teaching. It is inevitable that teachers will need to understand, practice, and implement the foundations of co-teaching either directly in a co-taught classroom model for children with and without disabilities or indirectly through collaboration and teamwork with other teachers and related service providers (Arthaud, Aram, Breck, Doelling, & Bushrow, 2007; Kamens, 2007; Kluth & Straut, 2003). It is becoming increasingly common for teachers of all grades and subjects to utilize their collaboration skills to meet the diverse needs of their students. General education teachers are expected to collaborate and often co-teach with special education teachers,

service providers, and/or other content area teachers to implement appropriate content to students with a variety of learning styles and levels of functioning (Bacharach, Heck, & Dahlberg 2008).

Co-teaching in the Literature

In a meta-synthesis of qualitative research looking at co-teaching models, it was found that while university teacher preparation programs address the need for and importance of collaboration among colleagues, co-teaching is not necessarily explicitly taught in teacher training programs. Therefore, there is a need for teachers to be exposed to this model (Scruggs, Mastropieri, & McDuffie, 2007). Higher education faculty must practice what they preach. Collaboration, ongoing effective communication, and structured supports are all critical aspects to succeeding in today's schools for students with and without disabilities. Therefore, these tenets must also be present in the higher education classroom. Although there is currently minimal research looking at the effects of co-teaching in higher education, it is considered best practice to exemplify collaboration, communication, shared planning, and teamwork that mirrors the expectations that are placed on today's teachers.

While additional studies are needed on the impact of co-teaching in higher education, preliminary work has been done. Conderman and McCarty (2003) discussed co-teaching a course that included content on inclusion at the university level. They felt that by pooling their resources, materials, experiences, and strengths, the classroom experience was robust and more comprehensive than if taught by only one instructor. Similarly, Graziano and Navarrete (2012) worked together to co-teach and collaboratively plan an undergraduate course on second language acquisition. While planning and reflection time was essential to their success, they also found a link between an increase in the quantity and quality of student engagement. For example, parallel and station teaching provided more individualized instruction, which increased the amount of interactions and engagement among students, as well as between students and instructors.

Sachs, Fisher, and Cannon (2011) also found that using a co-taught method in the classroom may entice future and practicing teachers to take on opportunities to be a part of co-taught classrooms. In addition to the benefits for their students, they gained insight into the unique instructional strategies and the knowledge base of their co-teaching professional partners. In this case study, a senior faculty member co-taught with two doctoral students and argued for teacher education training not only to model collaboration for pre-service teachers but also for pre-service higher education teachers. To build and maintain quality collaborative teaching relationships, the authors identified several key factors such as "strong accountability and professionalism; mutual creation and demonstration of respect; affirmation and overt participation in reciprocal growth and development; attention to issues of power and abeyance" (Sachs, Fisher, & Cannon, 2011, p. 70).

Additionally, Arthaud et al. (2007) studied the development of collaboration skills in pre-service teachers. In their co-taught college-level course, they used simulated school experiences in which students practiced collaborating with others on referrals, intervention planning, and intervention implementation. As a result of the course, students reported they learned about the barriers to collaboration and gained opportunities to practice problem-solving skills prior to real-life decisions they will make in the future within their actual teaching positions. Yopp, Ellis, Bonsangue, Duarte, & Meza (2014) also supported collaborative work in higher education classrooms when they found their co-teaching model for mathematics teacher preparation to have a positive influence on student learning.

Waters and Burcroff (2007) demonstrated an example of directly teaching pre-service educators the skills needed for effective collaboration and co-teaching. They co-taught a pre-service teacher education course by utilizing the model of special educator and general educator co-teaching to meet the needs of their students. They indicated a few key findings as a result of their work. Specifically, they found that students responded positively when specific strategies to address inclusion were modeled by the professors and that students benefited from co-teachers sharing metacognitive reflections with students. The authors identified the need to improve teacher preparation programs to prepare students to successfully gain the skills to educate the diverse population of students in schools today. While pre-service educators often experience the co-teaching model first hand through field experiences and student teaching requirements, it is both valuable and logical that they have the experience of being the recipients of such a model in their college or university teacher training courses (Waters & Burcroff, 2007). While there is some evidence that co-teaching in higher education is beneficial for student learning, additional investigation to support the model is needed (Arthaud et al., 2007; Dugan & Letterman, 2008; Waters & Burcroff, 2007).

As the demands for general and special educators to co-teach in K-12 schools continue to grow, there remains a need for investigating how to model this partnership for pre-service teachers. As a result of further experimentation and both qualitative and quantitative research in this area, higher education professionals can learn how to improve their ability to meet the needs of future teachers.

Motivation for Co-Teaching

The purpose of this article is to discuss the process and model used for co-teaching in a graduate-level practicum course for pre-service special educators. This article identifies essential relationship-building and collaborative work that special education teachers engage in on a daily basis. It places an emphasis on a co-taught, practicum-based course that involves guiding students to plan, teach, and work in classrooms, home, and community settings with families of students with disabilities. The model used as an example is a course called *Working with Families of Students with Disabilities*. Students enrolled in this course were studying toward their graduate degrees in special education and New York State teaching certification in special education and general education with an emphasis on teaching students with Intellectual Disability (ID) and Autism Spectrum Disorder (ASD). Preliminary qualitative and quantitative data on the graduate-student experience in this co-taught practicum course are shared.

The course titled *Working with Families of Students with Disabilities* is a required practicum course for graduate students pursuing a master's degree and certification in special education with a concentration in ID/ASD. There are two sections of this course offered each spring, which are combined into one large co-taught practicum-based course. The class itself meets once a week for the duration of the semester and covers topics on families of children with disabilities throughout the lifespan, including infancy, early intervention, preschool, school age, adolescence, and adulthood as shown in Table 1. Furthermore, family and professional communication, collaboration, and partnerships are all emphasized in class activities and instructions using a co-taught model. As a course requirement students are matched with a family of a student with a disability and complete 16 hours of work with the family in the home and/or community settings throughout the semester.

Practicum Placements

One instructor served as the practicum placement coordinator in order to assign one consistent contact for families. Families who participated in the practicum had anywhere from one to two children with a disability. They lived in or around Manhattan and were recruited by the professors through outreach to local agencies and school districts. Practicum students were matched with a family based on age/grade range of their New York State teaching certification track, location, and disability focus. Both instructors served as mentors to students throughout their practicum completion, and they consulted with each other when needed during the guidance process.

Instructors

Both instructors are state-certified special education (one in New York and one in Connecticut) teachers and have extensive background teaching students with various disabilities in general and special education settings. Both instructors earned doctoral degrees in special education with a focus on ID/ASD. Collectively, they have more than 20 years of experience as special educators in school and community-based programs for students and families of children with a wide variety of high and low incidence disabilities ages birth through adulthood.

Students

There were 26 students enrolled in the course. Seventeen were seeking certification in New York State in grades one through six in both general and special education. Five students held initial certification in special education and were in the process of completing their graduate degree, as well as an annotation on their certification in teaching students with severe and multiple disabilities. Four students were seeking certification in special education grades seven through 12. All students had a specific interest in teaching students with ID/ASD.

Table 1: Class Session Topics

Class Session Topics	
Introductions and overview of course requirements and projects	Legal issues and working with families
Family characteristics, interaction, and function	Collaborating with professionals to support families
Interview process and interacting with families	How do we develop partnerships? Challenges, barriers, and positive support for families
Family-professional collaboration	
Families and children with disabilities: Infancy and early childhood	Families as partners in developing Individualized Education Plans
Families and children with disabilities: School age	Family training: Best practices
Families and children with disabilities: Adulthood	Final student presentations

Course Objectives

While the main goal of this course is for students to acquire the knowledge and skills to work effectively with families of children with disabilities, the secondary objective is for students to experience and understand the benefits of a co-taught model.

The following objectives for this course were developed collaboratively by both professors based on their research, past syllabi for this course, and the professors' collective experiences as special educators working with families of children with disabilities.

By the end of the term, students will be able to:

- Discuss the theoretical family system perspectives and identify the family characteristics, interactions, and functions.

- Identify the historical role of special education and the context for family and professional collaboration as it relates to legislation and policy.

- Discuss the Family Life Cycle Theory and the stages of the life cycle of an individual with a disability as well as their family's life cycle.

- Provide students with a contemporary empowerment framework for conceptualizing collaboration, in general, and positive family-professional partnerships, specifically.

- Develop strategies for working with families of children with disabilities by meeting the families' basic needs, referring and evaluating for special education, individualizing for appropriate education, extending learning in home and community, attending and volunteering at school, and advocating for systems improvement.

- Implement seven levels of family-professional partnerships including: communication, professional competence, respect, trust, commitment, equality, and advocacy with a family of a child with a disability.

- Understand the basic principles and strategies of effective co-teaching.

Planning for Co-Taught Class Sessions

Prior to the start of the semester, both instructors created the course syllabus as a team. Although the course has been taught by other instructors in prior years, adjustments were made based on current practice, legislation, student population, and the implementation of the co-taught method. Once the syllabus was finalized, the instructors met at least once a week to plan class sessions. Phone meetings and email communication were utilized as needed. Throughout the semester, the instructors worked together in planning, teaching, and grading assignments to ensure collaboration and consistency in these areas. Planning included a brief lecture on the class session agenda, background or theory, a class activity, and student reflections based on their practicum experiences. Choosing the appropriate co-teaching model for each portion of the class session was carefully planned and orchestrated. Rubrics and guidelines for course assignments were co-created at the start of the semester. Each professor assessed course assignments, papers, and projects for 50% of the students enrolled in the course. Prior to finalizing assignment grades and returning assignments to students, the professors reviewed scores and feedback for all students collaboratively. The weekly co-taught class topics are discussed in the following section.

Implementation of Co-teaching Models

All topics were implemented using a variety of co-teaching models; these models were presented to students as they were implemented. The professors explained the rationale of the particular co-taught strategy being used, as well as discussed the successes and challenges of the co-taught method. They found team teaching, one teach-one assist, parallel teaching, and station teaching to be the most appropriate and successful forms of co-teaching for this course. For example, at the start of the semester the professors focused a class session on how to begin building collaborative relationships with families of children with special needs. This lesson included a brief lecture paired with whole-group discussion and small-group activities. Handouts, as well as the use of web links, were used during the discussion portions of the lesson. Therefore, the co-teaching models that were utilized during this lesson were one teach-one assist and team teaching. The one teach-one assist model was used as one professor was lecturing and explaining directions, while the other professor disseminated handouts to the students and assisted them with accessing the appropriate web links. Team teaching was also used throughout the lecture and small-group activity portions of this lesson. To implement team teaching, both professors worked together and were actively engaged in the lecture and the small-group activity focused on the same content. Table 2 provides three examples of class session topics, activities, and co-teaching models utilized during the semester.

Preliminary Data

Students were asked to rate their experiences as part of the course evaluation process using a Likert scale (strongly agree, agree, disagree, and strongly disagree), regarding various aspects of the co-teaching model that was used for their course. A summary of their ratings is provided in Table 3. Based on the data, the two most prominent goals of this course were met: First, 100% of the students in this co-taught class either strongly

Table 2: Class Session Examples

Topic	Class Activity	Co-Teaching Model
Interview process	Students created a list of initial family interview questions. Students divided into small groups and each instructor was assigned two to three groups to guide through the process. Then, students used the set of questions to interview each family in real-time (Skype) at which point the instructors team taught as they guided the class as a whole.	Parallel Teaching and Team Teaching
Legal issues	Students were assigned to sections of the New York State procedural safeguards for parents. Small groups were formed and the instructors were stationed at their assigned table to guide the groups through the process. The class then came together to discuss their findings as one group.	Station Teaching
Family training	Examples of family training models were presented by both instructors. Instructors took turns modeling and complementing each other's presentations. Students were then guided through the process of being presented with a family goal and asked to create a brief intervention plan with both instructors as coached through the development.	Team Teaching

Table 3: Student Likert Scale Ratings

Question	Strongly Agree	Agree	Disagree	Strongly Disagree	Skipped Question
1. I feel that I gained valuable knowledge and am more prepared to work with families of students with disabilities in school and home settings as a direct result of the co-teaching model used for this course.	18	6	2	0	0
2. I like the way the professors worked as a collaborative teaching team.	20	5	1	0	0
3. I feel more prepared to work in a co-taught classroom due to the experiences of being in a co-taught class than I did before the start of this course.	20	4	2	0	0
4. I gained useful knowledge related to co-taught teaching strategies, communication, and working directly with families as a result of this co-taught class.	19	5	2	0	0
5. I gained a better understanding of how to implement a variety of co-taught models in a classroom setting.	24	2	0	0	0
6. I am interested in enrolling in other courses that are taught by professors that utilize this type of co-teaching model.	11	10	3	0	2

agreed or agreed with the statement: *I gained a better understanding of how to implement a variety of co-taught models in a classroom setting.* Second, 92.3% of the students in this co-taught class either strongly agreed or agreed with the statement: *I feel that I gained valuable knowledge and am more prepared to work with families of students with disabilities in school and home settings as a direct result of the co-teaching model used in this course.* Furthermore, 96.1% of the students in this co-taught class liked the way the way the professors worked as part of a collaborative teaching team. Ninety-two percent of the students

felt more prepared to work in a co-taught classroom due to the experiences of being in a co-taught class and gained useful knowledge related to co-taught teaching strategies, communication, and working directly with families as a result of this class. Based on the results, 81% of the students were interested in enrolling in additional courses that utilize a similar co-taught model.

In addition to the Likert scale questionnaire, at the end of the semester, two research assistants facilitated a student focus group. Twenty-two of the 26 students enrolled in the course

participated in the focus group session. Students were asked to reflect on the greatest strengths of the course and areas that they thought were in need of improvement regarding the co-teaching aspect of this class.

Overall, students responded positively to the co-taught model of the *Working with Families of Students with Disabilities* course. Eighty-two percent of the students who participated in the focus group discussed strengths of the course related to learning in a co-taught environment. Some comments that reflect the beneficial effect this co-taught course had on student learning included: "*I love seeing the co-teaching model first hand.*" "*I really enjoy Dr. S. and Dr. M. teaching together; they make a really great team, and they showed us how co-teaching actually works.*" "*I think this co-teaching model was a good example of how co-teaching should take place in our classrooms in the future.*" "*Loved seeing how co-teaching is done.*" "*I like the co-teaching model. It allows us, as the students, to gain more knowledge and understand the principles of co-teaching during one class.*" Students who participated in the focus group noted that not only did they benefit from having two professors with a range of knowledge and experiences but they also gained a better understanding of the principles and implementation practices of co-teaching.

Thirty-two percent of the students who participated in the focus group discussed areas of improvement in the course related to the co-taught aspect. Students expressed concern with consistency in grading between the professors and clarity on which professor to direct questions and concerns about practicum and course assignments. Some of the students' comments included: "*I felt the grading was inconsistent among professors.*" "I was confused about which professor to contact when I had questions outside of class." An outline of their comments can be found in Table 4 at the end of this article.

Final Reflections and Future Directions

Teaching collaboration skills is at the heart of creating effective educators for the future. Modeling collaboration and teamwork in the higher education classroom is a crucial step toward molding educators who can successfully work in teams (Waters & Burcroff, 2007). It is evident that these skills need to be modeled and taught to pre-service teachers so they can be adequately prepared as educators. We believe a key aspect of our role as teacher educators is to prepare teachers to work together as collaborative teams to ensure that all students with disabilities and their families can reach their greatest potentials. Co-teaching and collaborative teamwork in the field of education is a growing focus in schools, especially when educating students with disabilities. This preliminary look at co-teaching at the college level in a practicum course for pre-service educators helped us to gain insight into this important and relevant model. Our experience has provided a starting point for future implementation.

While this article describes the teaching model we explored in an effort to demonstrate co-teaching in the higher education classroom, additional investigation needs to occur with a variety of instructors, colleges, and teacher education programs. Building partnerships with higher education faculty in general education programs is the next logical step in researching the most effective outcomes of the co-teaching model in college and university classrooms. By taking a further look into similar teaching models, we can begin to identify the elements that not only make a lasting impression on pre-service teachers, but also inspire and set a precedent for teamwork for the benefit of children and families who are so desperately in need of academic, behavioral, and social support.

References:

Arthaud, T., Aram, R., Breck, S., Doelling, J., & Bushrow, K. (2007). Developing collaborative skills in pre-service teachers: A partnership between general and special education. *Teacher Education and Special Education, 30*(1), 1-12.

Bacharach, N., Heck, W. T., & Dahlberg, K. (2008). Co-teaching in higher education. *Journal of College Teaching and Learning, 5*(3), 9-16.

Conderman, G., & McCarty, B. (2003). Shared insights from university co-teaching. *Academic Exchange, 7*(4), 1-7.

Cook, L., & Friend, M. (1995). Co-teaching: Guidelines for creating effective practices. *Focus on Exceptional Children, 28*(3), 1-16.

Dugan, K., & Letterman, M. (2008). Student appraisals of collaborative teaching. *College Teaching, 56*(1), 11-15.

Graziano, K. J., & Navarrete, L. A. (2012). Co-teaching in a teaching education classroom: Collaboration, compromise, and creativity. *Issues in Teacher Education, 21*(1), 109-126.

Harris, C., & Harvey, A. (2000). Team teaching in adult higher education classrooms: Toward collaborative knowledge construction. *New Directions for Adult and Continuing Education, 2000*(87), 25-32.

Kamens, M. (2007). Learning about co-teaching: A collaborative student teaching experience for pre-service teachers. *Teacher Education and Special Education, 30*(3), 155-166.

Kluth, P., & Strout, D. (2003). Do as we say and as we do: Teaching and modeling collaborative practice in the university classroom. *Journal of Teacher Education, 54*(3), 228-240.

Marshall, A. M. (2014). Embedded professional development for teacher educators: An unintended "consequence" of university co-teaching. *International Journal of University Teaching and Faculty Development, 5*(1), 17-30.

Sachs, G. T., Fisher, T., & Cannon, J. (2011). Collaboration, mentoring, and co-teaching in teacher education. *Journal of Teacher Education for Sustainability, 13*(2), 70-86.

Scruggs, T. E., Mastropieri, M. A., & McDuffie, K. A. (2007). Co-teaching in inclusive classrooms: A metasynthesis of qualitative research. *Exceptional Children, 73*(4), 392-416.

Waters, F. H., & Burcroff, T. L. (2007). Collaborative teaching at the university level: Practicing what is preached. *The Teacher Educator, 42*(4), 304-315.

Yopp, R. E., Ellis, M., Bonsangue, M. V., Duarte, T., & Meza, S. (2014). Piloting a co-teaching model for mathematics teacher preparation. *Issues in Teacher Education, 23*(1), 91-111.

Emily R. Shamash

Emily R. Shamash, Ed.D. *is a lecturer of special education and practicum coordinator in the Intellectual Disability and Autism programs at Teachers College, Columbia University. Her research interests include natural environment teaching for students with autism and related disabilities, families of children with disabilities, and special education teacher education. She can be reached via e-mail at erg2004@tc.columbia.edu.*

Alyson M. Martin

Alyson M. Martin, Ed.D. *is an assistant professor of special education in the Graduate School of Education and Allied Professionals at Fairfield University. Her research interests include special education teacher burnout and stress, working with families with children with disabilities, as well as co-teaching practices in higher education. Martin can be contacted at amartin8@fairfield.edu.*

Table 4: Student Responses in a Focus Group Setting

Open-Ended Questions	Comments
1. Please describe the greatest strengths of the co-taught aspect of this course.	The practicum was wonderful! Definitely gave a new perspective to the graduate program and to implementing the co-taught model. I think the co-teaching worked for this class.
	Having hands-on experiences with co-teaching strategies and hearing different experiences from both teachers.
	I really like the co-teaching model that Dr. M. and Dr. S. modeled for us. They bring in information and anecdotes from their own experiences in order to facilitate our learning. I also enjoyed being able to share my own experiences working with my family in a safe and comfortable atmosphere.
	Great cooperation between both teachers, it is not a setting that always works, but you guys make it work really well, great input and stories, also made me understand the co-teaching model better.
	Firstly, thank you a lot for doing this survey. It's just nice to know that our feedback will go straight to you guys, and that you will be reading it. For me, there were a lot of strengths in the course. I really enjoy Dr. S. and Dr. M. teaching together; they make a really great team, and they show us how co-teaching actually works. They keep the class fun and interesting. I just appreciate the course being so informative AND fun. Especially having the class so late, the energy that Dr. M. and Dr. S. bring to the class is great. Definitely my favorite class of the semester.
	Love the co-teaching system in terms of getting two different perspectives and experiences and seeing how to implement co-teaching strategies first hand.
	The realistic situations, co-teaching strategies, and experiences from both professors provide excellent advice for our future professional careers as teachers as well as working with families. Liked how they shared how they dealt with the challenges of co-teaching.
	I feel that this course was co-taught well because you both have similar teaching styles and values and because you explained what co-teaching models you were using as we did different activities. However, I have taken many courses where this co-teaching model is not beneficial to the students.
	I liked the co-teaching model a lot, and enjoyed learning from both professors. A few classes went a bit over schedule, but that is truly the only less than positive comment I can think of. Would recommend this class/these professors. I would also take a co-taught class with them again!

Table 4: Student Responses in a Focus Group Setting (Continued)

Open-Ended Questions	Comments
	I think this co-teaching model was a good example of how co-teaching should take place in our classrooms in the future.
	Loved seeing how co-teaching is done. Great class, I learned a lot. Thank you very much!
	I loved it, and I thought it was great to have the opportunity to receive insight from both teachers who have different backgrounds, ideas, and different styles of teaching. The class was great and much more interactive because of the co-teaching model.
	I like the co-teaching model. It allows us, as the students, to gain more knowledge and understand the principles of co-teaching during one class. Both teachers have a lot of experience and their experiences have been different. This allows us to hear multiple perspectives about a topic.
	Nice to see it work so well in practice.
	I love seeing the co-teaching model first hand. It's incredibly interesting to have the two different perspectives of professors with experience. I also feel like most students in our program get along really well, and it's nice to all be together and hear from everyone about their experiences. Dr. S. and Dr. M. should teach more co-taught classes!
	I enjoy the co-teaching model because I feel it's always useful to have more than one experience on the same topic and because I got experience with different co-teaching strategies.
	Great to get a real picture of basic co-teaching models and why they are important. Both professors really build off of each other and contribute a wide range of information and knowledge to us.
	I thought the family practicum was an amazing experience. It is an important role of a teacher's career, to deal with families and to learn about co-teaching, and it should be focused on more. Great class!
2. Please describe areas of needed improvement regarding the co-taught aspect of this course.	I think having greater support for developing permanent products would be beneficial. Also, I was confused about which professor to contact when I had questions outside of class.
	More specific lessons and less student sharing. I think the professors graded differently.
	I think that we would get more out of this class if we took it over the summer in a small group. It was a little overwhelming trying to get my hours in with my family while simultaneously student teaching and taking a full course load. I also was confused about who was grading my assignments when.
	I felt like one professor knew the program better and was better at answering my questions.
	This class would go smoother if it was smaller. Also, I wasn't sure which professor to talk to about concerns and questions I had.
	I felt the grading was inconsistent among professors.
	I think that the co-teaching model is always nice, but in this instance the information in the class is not extremely difficult, so it would have benefited me more to have two smaller groups with one teacher each to promote more discussion. The professors have different experiences, which are nice to hear, but it did not benefit me nor take away from my experience working with my family to have one or two teachers in the class.

Quality Approaches in Education

Employing Lean Six Sigma to improve scheduling practices in education

Improving Room Scheduling for Special Events in Academic Environments – A Lean Six Sigma Case Study

Amruta Kulkarni and Jamison V. Kovach

Abstract

In academic environments, procedures have previously been developed to guide course scheduling efforts. Unfortunately, these methods do not typically include scheduling rooms for special events, meetings, or other functions. Therefore, this process is generally handled by each college and/or department separately. To centralize and improve the scheduling process, the University of Houston's College of Education recently implemented web-based scheduling software. There were, however, several aspects of this process that still took an excessive amount of time, which led to significant delays in responding to room scheduling requests. Hence, the goal of this research was to reduce the amount of time to schedule a room for a special event, meeting, or other function. The Lean Six Sigma methodology was used to define the problem, map the underlying process, identify the root cause(s) of waste/inefficiency, as well as to develop and implement solutions to create a more efficient room scheduling process. The details of this work are depicted in the form of a case study from which academic administrators and others may learn in order to conduct similar process improvement projects in their organizations.

Keywords

Lean Six Sigma, DMAIC, Cycle Time, Room Scheduling, Continuous Improvement

Introduction

Organizations that provide services to individuals or other organizations, as opposed to producing a tangible product of some kind, employ approximately two-thirds of the labor force in industrialized economies (Fitzsimmons & Fitzsimmons, 2004; Oliveira, Roth, Conley, & Voss, 2003). These organizations are typically found in a wide variety of industries, such as education, transportation, and healthcare. Within service operations, scheduling often plays an important role. For example, rooms are reserved for classes (Doshi & Trivedi, 2013), trucks are booked for shipments (Pinedo, Zacharias, & Zhu, 2015), and patients are scheduled for exams and surgery (Simon & Canacari, 2014).

In academic environments, the term "course timetabling" is generally used to describe the process of scheduling academic courses, and well-known procedures are established for completing this work (Miranda, 2010). Effective scheduling maximizes the likelihood of matching students, instructors, and rooms without creating conflicts (Mooney, Rardin, & Parmenter, 1996). However, the scheduling of other special events and/or meetings is often problematic because there are few systems/methods in place to guide this work. This research explores the application of the Lean Six Sigma methodology to improve the room scheduling process for special events, meetings, or other function in an academic environment. For the benefit of academic administrators and others, this work describes a case study regarding a project to reduce the amount of time to schedule a room for a special event, meeting, or other function where the goal was to better to serve faculty, staff, and students through more timely responses to their room requests.

Lean Six Sigma is a fact-based, data-driven improvement methodology that integrates the approaches used separately in Lean and Six Sigma to collectively reduce waste and variation in business processes (Pepper & Spedding, 2010). In addition, there is symmetry between the goals of Lean Six Sigma and service operations because each aims to improve customer satisfaction (Psychogios, Atanasovski, & Tsironis, 2012). Although several studies have demonstrated the use of Lean and/or Six Sigma in academic environments, this work focused mainly on improving decision making by university administrators. Largely this work has addressed solving operational problems, such as improving academic course scheduling procedures (Mooney, Rardin, & Parmenter, 1996), reducing the time for students to graduate (Jenicke, Kumar, & Holmes, 2008), analyzing students' performance on standardized tests (Kukreja, Ricks, & Meyer, 2009), and streamlining assessment processes (Bargerstock & Richards, 2015).

In this case study, the Lean Six Sigma Define, Measure, Analyze, Improve, and Control (DMAIC) approach was used to reduce the amount of time to schedule a room for a special event, meeting, or other function within the University of Houston's College of Education (COE). Specifically, the DMAIC approach begins in the Define phase with identifying the process that requires improvement (Prashar, 2014). The Measure phase consists of mapping the process flow and setting the baseline to obtain a measurement of the current process performance (Atkinson, 2014). The process, as well as data collected in the Measure phase, are then analyzed to determine the root cause(s) of waste and/or variation in the process during the Analyze phase (Prashar, 2014). In the Improve phase, solutions to the problem are identified and implemented. Finally, in the Control phase, monitoring techniques are implemented to ensure adherence to the improved process and to document the results of the improvement project (de Mast & Lokkerbol, 2012; Arafeh, 2015). Next, some background information about the room scheduling process is discussed, and the details regarding how the DMAIC approach was applied to reduce the amount of time to schedule a room are described.

Case Study

Within the University of Houston's COE, the Center for Information Technology in Education (CITE) provides technical services to the COE faculty, staff, and students. One of the functions of CITE is to oversee the room scheduling process for special events, meetings, or other functions. The COE has 36 rooms (including classrooms, conference rooms, and labs) and one general purpose room that can be scheduled for these purposes. There are five departments in the COE and each one has a separate scheduler. Previously, the process of scheduling rooms for special events, meetings, or functions was performed using the calendar function in Microsoft Outlook, and each department scheduler maintained a separate calendar used for reserving rooms. This meant that department schedulers had to check with one another continuously regarding the availability of rooms when they needed to schedule a room or change an existing room reservation.

In the summer of 2015, CITE implemented "YArooms," a web-based scheduling software, to centralize the room scheduling process, which schedulers from each department use to process room requests. The implementation of this new software reduced the complexity of the process, because when one scheduler reserves a room or edits or cancels an existing room reservation, this action is captured in the software program, and the schedulers in other departments can see this change. There are, however, several aspects of the room scheduling process that still require an excessive amount of time to complete, which often leads to significant delays in responding to faculty, staff, and students' requests to schedule rooms. This case study illustrates how the Lean Six Sigma methodology was used to reduce or eliminate sources of waste in this process to achieve the goal of providing more timely responses to room requests.

Define Phase

To provide a firm foundation for this work, a project charter was created that specified the scope and objectives, as well as the team members and other stakeholders involved, including their roles and responsibilities. Management's approval of the charter provided the authorization needed to start the project. The following statements describe the project's purpose and goal in detail.

> *Problem statement*: The amount of time it takes to schedule a room for a special event, meeting, or function for the COE's CITE has averaged 59 hours in the last two months (Sept. 15 to Nov. 15, 2015), resulting in room scheduling delays.

> *Mission statement*: Reduce the average amount of time it takes to schedule a room for a special event, meeting, or function to 36 hours or less over the next eight months (by April 20, 2016), resulting in fewer room scheduling delays.

Measure Phase

To develop an understanding about the process being investigated, a high-level depiction of the process was created using a suppliers, inputs, process, outputs, and customers (SIPOC) diagram. As shown in the center of Figure 1, first a room

reservation request is received. Then, the availability of the requested room is checked by looking at the schedule stored in YArooms, and if the requested room is available, the room is reserved. Finally, the requestor is notified and the room

reservation is confirmed. The inputs for this process are the room requests, CITE staff, YArooms software, and the room schedule, which are supplied by University of Houston faculty, staff, and students, as well as CITE and the software vendor.

Suppliers	Inputs	Process	Outputs	Customers
University of Houston (UH) faculty, staff, and students UH College of Education (COE), Center for Information Technology in Education (CITE) Software vendor	Room requests CITE staff YArooms (software) Room schedule	1. Receive room request 2. Check availability of room 3. Reserve room, if available 4. Notify requester 5. Confirm room reservation	Reserved rooms Updated room schedule (in YArooms) Updated CITE lab spreadsheet	UH faculty, staff, and students Scheduler UH COE, CITE

Figure 1: High-Level View of the Room Scheduling Process
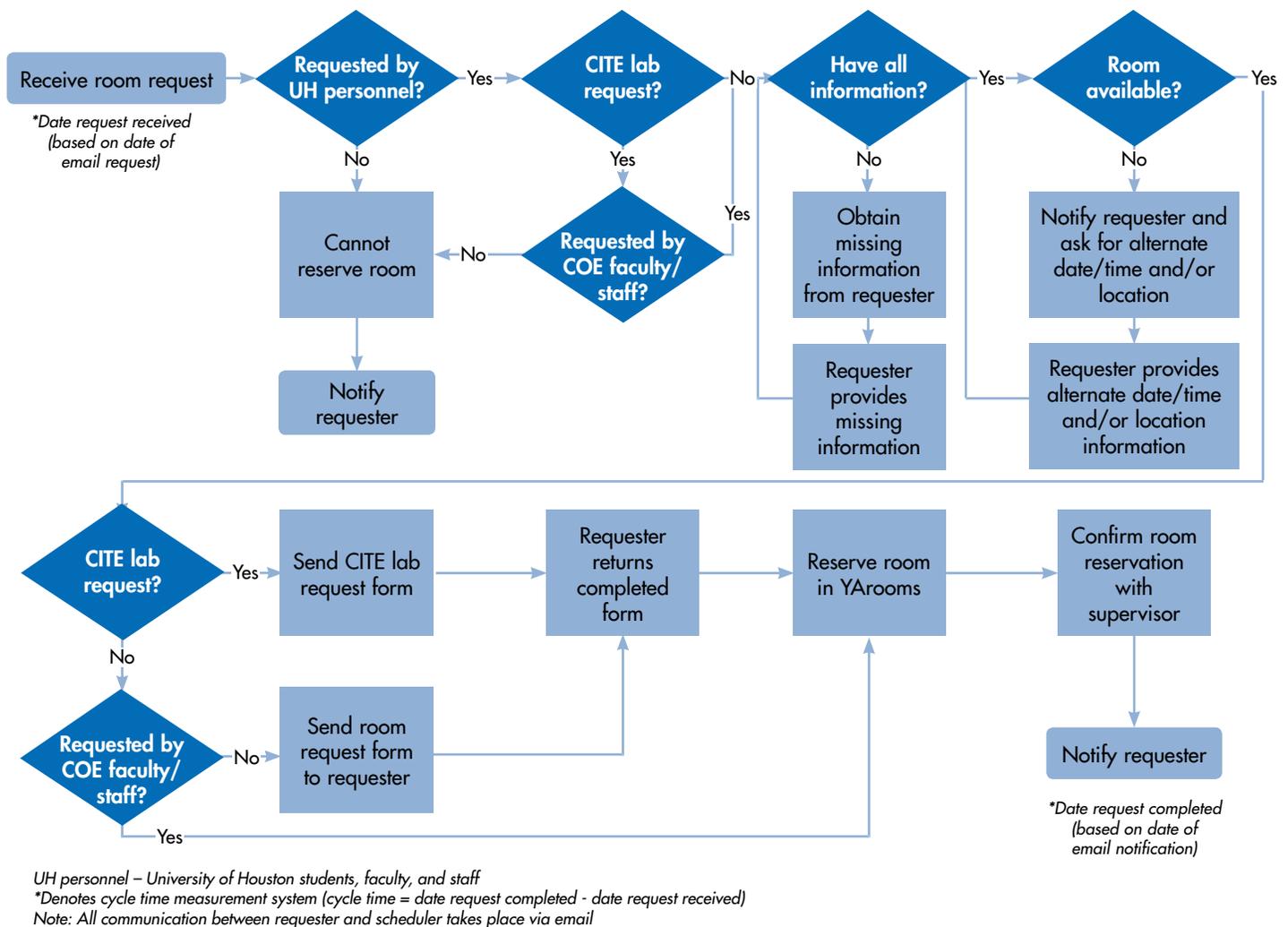
Figure 2: Detailed View of the Room Scheduling Process

UH personnel – University of Houston students, faculty, and staff
*Denotes cycle time measurement system (cycle time = date request completed - date request received)
Note: All communication between requester and scheduler takes place via email

The outputs of this process are the reserved rooms and updated schedules and spreadsheets, and these are used by University of Houston faculty, staff, and students, as well as schedulers and CITE.

Next, a flowchart was created to document the details associated with the room scheduling process, which is quite complex. Figure 2 illustrates that the process flow is based on the type of requester and room requested. In fact, only University of Houston faculty, staff, and students can reserve rooms through this process. If a request is received from someone outside the University of Houston, they will be notified that they cannot reserve a room. If a CITE lab is requested, then the requester must be a COE faculty or staff member. Once these two conditions are confirmed, then the scheduler checks if the required initial information (e.g., event date, time, and number of attendees) was provided. If not, the scheduler obtains the missing information from the requester. When all the initial information is available, the scheduler checks whether the requested room is available. If it is not available, the scheduler notifies the requester and asks for an alternate date, time, and/or location. If the requested room is available, the scheduler sends the appropriate request form to the requester based on the type of room needed and type of requester. If the request is to reserve the CITE lab, the scheduler sends the CITE lab request form. If the request is not for the CITE lab and the requester is not a COE faculty/staff member, the scheduler sends a room request form. If, however, the requester is a COE faculty/staff member, they do not need to submit a form to reserve a room. Once the requester returns a completed form, the scheduler reserves the room in YArooms and confirms the reservation with his or her supervisor. Finally, the scheduler notifies the requester that the room has been reserved. In this process, all communication between the scheduler and requester takes place via email.

The measurement system used to calculate the cycle time of the room scheduling process (e.g., the amount of time to schedule a room for a special event, meeting, or other function) is denoted by "*" in Figure 2. The cycle time is calculated based on the date a room request is completed minus the date it was received. Thus, it was necessary to obtain the date received and completed for each request during the past few months to establish a baseline measurement of the current process performance (e.g., how long, on average, it took to schedule a room). These data were collected from email records during a two-month period (Sept. 15 to Nov. 15, 2015). During this time, a total of 95 room requests were completed, and the cycle time ranged from 0.03 to 746 hours with an average of 59.04 hours and a standard deviation of 129.02 hours.

Analyze Phase

To identify potential causes of excessive room scheduling process cycle time, a brainstorming session with the five department schedulers was held. During this session, ideas were developed regarding the possible causes for excessive cycle time, and these were organized into five main categories using a cause-and-effect diagram. These categories included process, people, information, technology, and room. Next, using nominal group technique (NGT), the schedulers were asked to rank-order the five items from the cause-and-effect diagram that they felt had the greatest impact on the problem, where the item they ranked as "5" indicated they felt this item had the most significant impact and the item they ranked as "1" indicated they felt this item had the fifth most significant impact based on their experience working in the process. Individual rankings were summed across participants for each possible cause, as shown in Figure 3. The item "unspecified requirements" was identified as the root cause of the problem because it received the highest score. Addressing this root cause then became the focus of the project moving forward.

Potential Cause	Team Member					Total
	A	B	C	D	E	
Information: Non-availability of initial information (no form required) – Unspecified requirements	3	5	3		2	13
Process: Lack of knowledge – students	2			5	4	11
People: Delay due to late response from requester	1	4	2		3	10
Process: Complexity of the process			4	4	1	9
Process: No standard process			1	3	5	9
People: Non-availability of scheduler		3	5	1		9
People: Poor communication – between departments	4			2		6
People: Poor communication – between CITE and departments	5					5
Information: Incomplete room request form – missing signatures		2				2
Room: Requested room not available		1				1

Figure 3: Prioritization of Possible Causes of the Problem

Improve Phase

To develop a list of possible solutions, once again a brainstorming session was held with the five schedulers to identify possible solution ideas to address the problem of unspecified requirements for room requests. During this session, a total of 10 ideas were generated, and the schedulers were asked to use NGT to rank-order the five solution ideas they felt had the highest likelihood of helping to clearly specify the requirements for room requests, where "5" represented the solution having the highest likelihood and "1" represented the solution having the fifth highest likelihood. Again, individual rankings were summed across all participants for each possible solution idea. The five potential ideas with the highest total score were then considered further.

To determine the best solution, a prioritization matrix was used, as shown in Figure 4. This tool helped to prioritize and narrow the remaining five possible solution ideas by evaluating them based on the desired characteristics identified by the project team (listed in the left column of Figure 4). This evaluation identified how well each solution option fulfilled each characteristic, where "9" represented that the solution idea fulfills the desired characteristic, "3" represented that the solution idea somewhat fulfills the desired characteristic, and "1" represented that the solution idea does not fulfill the desired characteristic. After evaluating all cells in the matrix, the total points for each solution idea were determined by summing the values down each column. Developing a single request form was identified as the best solution because it had the highest score.

The new room request form was designed with the help of the schedulers and CITE's instructional designer to ensure it collected the required information and addressed the needs of all involved in the process. The form was developed using a Google docs application that was then posted on CITE's website to make it available for University of Houston faculty, staff, and students to use when submitting room requests. This form has logic built in that directs the requester to the correct questions based on who they are and what type of room they are requesting. Additionally, fields identified as "required" must be filled in before the request can be submitted. Finally, if schedulers receive room requests from any other source, they are to respond to the requester to let them know they must use the online form to submit the request. By implementing this new room request form, all the information needed for a room request is available to the scheduler when needed.

The revised flowchart, shown in Figure 5, illustrates the improved process, which is much less complex than the original process (see Figure 2). Whereas the original process had 20 steps, the improved process has only seven. Now, when a request is submitted through the online form, it is automatically placed in the Google spreadsheet linked to the form. Using this information, the scheduler then checks whether the requested room is available. If the room is not available, the scheduler notifies the requester and asks for an alternate date, time, and/or location. Once availability of the room is confirmed, the scheduler reserves the room in YArooms and updates the spreadsheet by entering the date and time the request was completed. Finally, the scheduler notifies the requester via email to confirm the room reservation.

Figure 5 also depicts the measurement system used to collect data to calculate the cycle time of the room scheduling process (denoted as "*"). When the requester submits an online form, the date and time of the form submission are automatically time-stamped and noted as the "date request received" in the spreadsheet. Then, when the scheduler completes the

Desired Characteristics	Solution Ideas				
	Develop a single request form	Define the process on COE's website	Unify the current process	Integrate YArooms and Outlook	Develop a communication plan
Ease of implementation	●	●	●	▲	●
Influence on process	●	▲	●	▲	▲
Cost effectiveness	●	●	●	●	●
Improvement in efficiency	▲	▲	▲	▲	▲
Provides documentation	●	■	■	▲	■
Total	**39**	**25**	**31**	**21**	**25**

Legend: ● = 9 ▲ = 3 ■ = 1

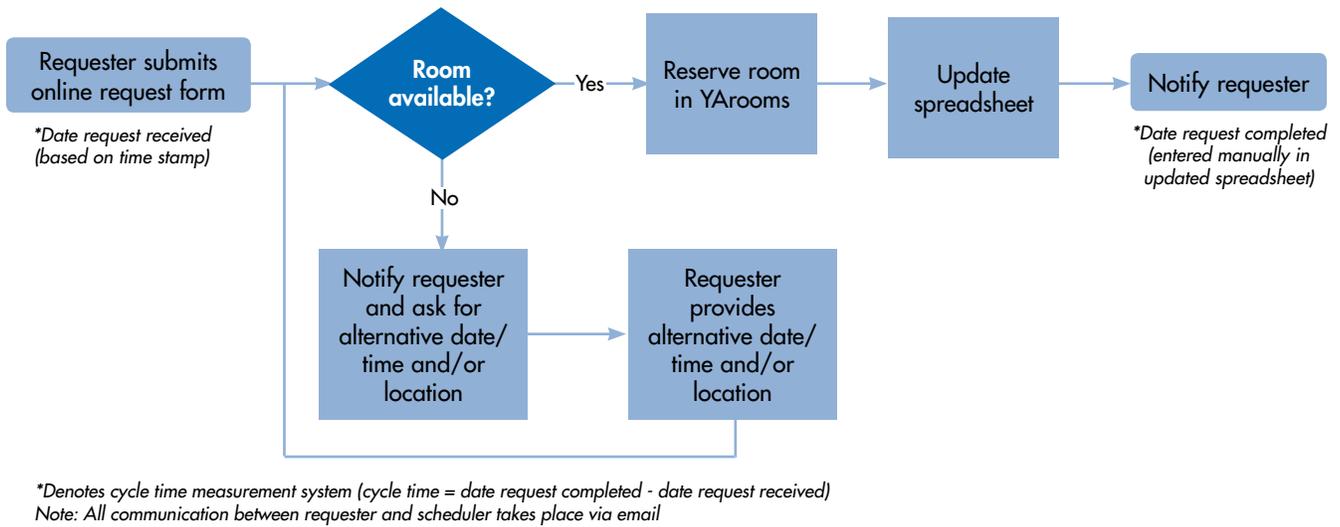**Figure 4: Prioritization of Solution Ideas**

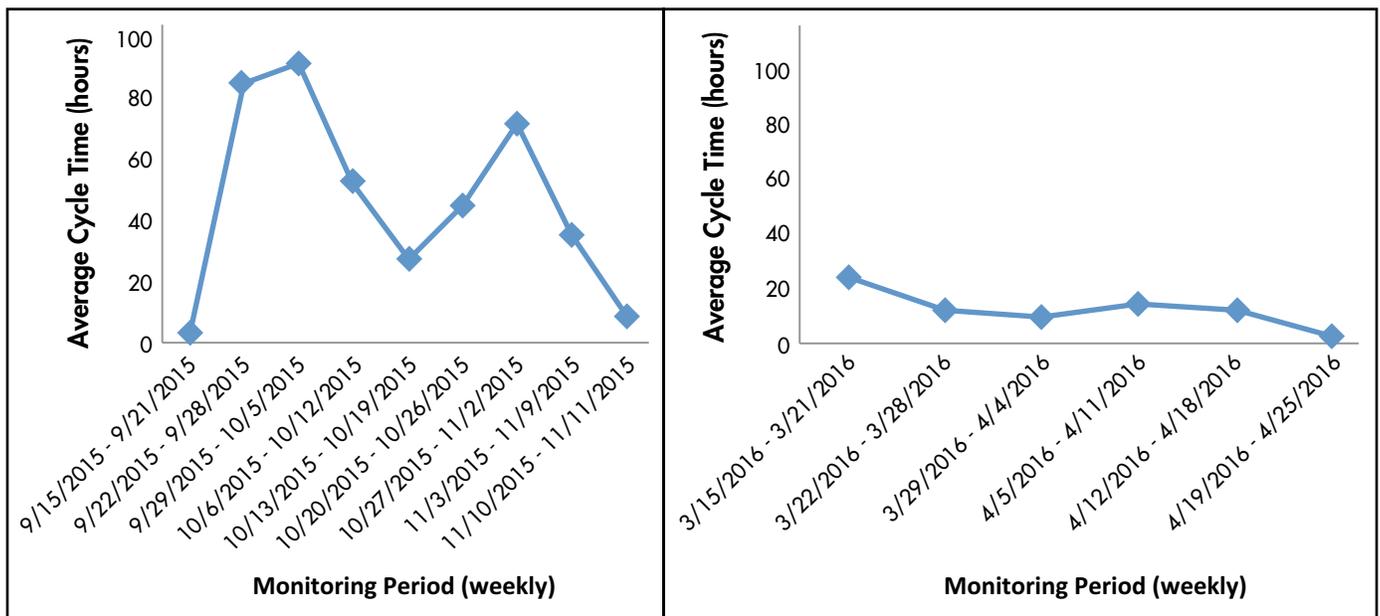**Figure 5: Detailed View of the Improved Room Scheduling Process**

Figure 6: Baseline (left) and Improved (right) Process Performance

request, he/she manually enters the date and time the request is completed in the spreadsheet, which is noted as the "date request completed."

After six weeks, data were collected to determine the performance of the improved process. During this time, a total of 30 room requests were completed. As shown in Figure 6, the average cycle time was reduced from an average of 59.04 hours with a standard deviation of 129.02 hours at the beginning of

the project (diagram on left) to an average of 13.37 hours with a standard deviation of 17.94 hours at the end of the project (diagram on right).

Control Phase

To ensure the improvements made as a result of this project were not lost over time, the new room scheduling process was documented (as shown in Figure 5), and the schedulers

were trained on how to obtain and use the data collected through the new online room request form. Additionally, a run chart, similar to that shown in Figure 6 (right), is now used to monitor the improved process performance on a weekly basis. If the average room scheduling process cycle time ever exceeds 24 hours, schedulers are to notify CITE's operations manager, who, along with the schedulers, will conduct a root-cause analysis to identify the cause for the increase in the time to schedule a room for a special event, meeting, or other function.

Conclusion

This case study investigated the application of the DMAIC methodology within an academic environment to reduce the time it takes to schedule a room for a special event, meeting, or other function. The implementation of a customized Google form posted online, which was developed through this research, now helps the department schedulers obtain the required information from requesters regarding their room requests, thus significantly reducing the complexity of the process, the amount of missing and/or incorrect information received, and the number of interactions (typically emails sent back and forth) between the schedulers and requesters. The project highlighted in this case study reduced the average cycle time of the room scheduling process for special events, meetings, or other functions by more than 75%, which exceeded the goal. Therefore, the College of Education is now better able to serve faculty, staff, and students through more timely responses to their requests to schedule rooms.

One drawback of the improved process, however, is that it requires schedulers to run three different applications simultaneously to complete a room request. Additionally, each scheduler must have a Gmail account in order to access the request information collected by the online form. Given that it is fairly common for one improvement project to lead to the identification of additional problems that may require additional improvement, this case study further demonstrates the practical nature of conducting process improvement projects. Administrators and others are encouraged to use the approach demonstrated in this case study to help guide future improvement projects in their organizations.

References:

Arafeh, M. (2015). Combining Lean concepts and tools with the DMAIC framework to improve processes and reduce waste. *American Journal of Operations Research, 5*(3), 209-221.

Atkinson, P. (2014). DMAIC: A methodology for Lean Six Sigma business transformation. *Management Services, 58*(1), 12-17.

Bargerstock, A., & Richards, S. (2015). Case study: Application of DMAIC to academic assessment in higher education. *Quality Approaches in Higher Education, 6*(2), 31-40.

Doshi, J., & Trivedi, B. (2013). Decision support system using DMAIC for academic scheduling: ICT in education support activities, *IEEE Fifth International Conference on Technology for Education* (pp. 73-75). Kharagpur: IEEE.

Fitzsimmons, J. A., & Fitzsimmons, M. J. (2004). *Service management.* Boston, MA: McGraw Hill Irwin.

Jenicke, L., Kumar, A., & Holmes, M. (2008). A framework for applying Six Sigma improvement methodology in an academic environment. *TQM Journal*, 20(5), 453-462.

Kukreja, A., Ricks, J. M., & Meyer, J. A. (2009). Using Six Sigma for performance improvement in business curriculum: A case study. *Performance Improvement, 48*(2), 9-25.

de Mast, J., & Lokkerbol, J. (2012). An analysis of the Six Sigma DMAIC method from the perspective of problem solving. *International Journal of Production Economics, 139*(2), 604-614.

Miranda, J. (2010). eClasSkeduler: A course scheduling system for the executive education unit at the Universidad de Chile. *Interfaces, 40*(3), 196-207.

Mooney, E., Rardin, R., & Parmenter, W. (1996). Large-scale classroom scheduling. *IIE Transactions, 28*(5), 369-378.

Oliveira, P., Roth, A. V., Conley, M. V., & Voss, C. (2003). Knowledge assets in global services strategy. In D. Gibson, C. Stolp, P. Conceicão, & M. V. Heitor (ed.), *Systems and policies for the global learning economy* (pp. 511-536). Westport, CT: Praeger Publishers.

Pepper, M. J., & Spedding, T. A. (2010). The evolution of Lean Six Sigma. *International Journal of Quality and Reliability Management, 27*(2), 138-155.

Pinedo, M., Zacharias, C., & Zhu, N. (2015). Scheduling in the service industries: An overview. *Journal of Systems Science and Systems Engineering, 24*(1), 1-48.

Prashar, A. (2014). Adoption of Six Sigma DMAIC to reduce cost of poor quality. *International Journal of Productivity and Performance Management, 63*(1), 103-126.

Psychogios, A., Atanasovski, J., & Tsironis, L. (2012). Lean Six Sigma in a service context – A multi-factor application approach in the telecommunications industry. *International Journal of Quality and Reliability Management, 29*(1), 122-139.

Simon, R., & Canacari, E. (2014). Surgical scheduling: A Lean approach to process improvement. *Journal of the Association of periOperative Registered Nurses, 99*(1), 147-159.

Amruta Kulkarni, M.S. *is an instructional assistant at the University of Houston. She is fully certified as a Lean Six Sigma Green Belt from the University of Houston, and she plans to advance her career in project management. Kulkarni is also a Certified Associate in Project Management through the Project Management Institute. Contact her via email at amrutakul06@gmail.com.*

Amruta Kulkarni

Jamison V. Kovach, Ph.D. *is an associate professor at the University of Houston. Her industrial experience includes several years as a process improvement engineer in the U.S. textile industry. Kovach is certified in Six Sigma Black Belt training, and she directs the Lean Six Sigma professional training program for the College of Technology. Her current research investigates how quality/continuous improvement approaches affect performance and/or decision making within organizations, expanding the use of these methods, and developing new improvement approaches. Her work has been published in a wide variety of peer-reviewed journals. Kovach was recognized as the 2010 ASQ Feigenbaum Medalist for her work, and she was promoted to full Academician in the International Academy for Quality in 2015. To learn more, contact her at jvkovach@uh.edu.*

Jamison V. Kovach

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.
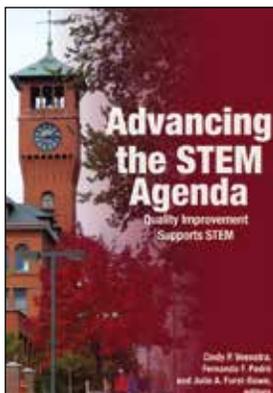
This publication is full of collaborative models, best practices, and advice for teachers, higher education faculty, and human resources personnel on improving the student retention (and thereby increasing the supply of STEM workers). Ideas that will work for both STEM and non-STEM fields are presented. 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

Responding to a call for action for quality improvement training for medical trainees

An Overview of Quality Improvement Training in Medicine: How Prepared Are Our Future Physicians?

Grace D. Brannan

Abstract

This article discusses the recent journey of medical training schools to prepare physicians on the topic of quality improvement. It cites landmark publications that prompted the discussions around patient safety. The contributions of many organizations to move healthcare training closer to target quality outcomes are also presented. Research shows an increase in quality improvement training of medical trainees since 2000. However, published studies regarding quality improvement training in medical schools indicates variability in training and a need for improved education on this topic.

Keywords

Medical Education, Quality Improvement Training, Accreditation, Healthcare

Introduction

Healthcare in the United States is challenged in providing accessible, affordable, safe, and patient-centered care. Quality improvement is at the heart of moving the needle in terms of patient safety and care. Landmark studies published more than a decade ago have shaped the discussion on improving healthcare and were followed by recommendations and policy changes at the national level.

With the cost of healthcare on the rise, not just in the U.S. but in most parts of the world, optimizing healthcare delivery and safety are critical. At the heart of this dialogue is the critical topic of preparing physicians to serve as active participants and leaders in moving the quality agenda forward. The ideal starting point for immersing future physicians in quality improvement is during undergraduate and graduate medical training. The goal of this article is to discuss the recent journey of medical training schools in preparing physicians in quality improvement. In this context, landmark publications that prompted the dialogues around patient safety and quality improvement are reviewed in a chronological manner. The work of many organizations to shift healthcare training closer to target quality outcomes is also examined.

Landmark Studies: A Call to Action

In the United States, the quality improvement journey was propelled by several landmark studies as shown in Figure 1. These three reports are certainly not the only publications on this critical topic, but they examined quality improvement from different levels and points of view: the public, government, and medical organizations.

In 2000, a groundbreaking publication by the Institute of Medicine (IOM), *To Err is Human*, discussed how the U.S. healthcare system is flawed with death-resulting, preventable medical errors (Kohn, Corrigan, & Donaldson, 2000). For the first time, it exposed a cause of death that is worse than commonly regarded frequent causes, such as cancer and AIDS: medical errors, including adverse events and surgeries on the wrong site. The loss can be staggering as evidenced by billions of dollars in lost wages for the patient; diminished trust in the hospital and healthcare system; and physical, psychological, and

emotional pain for the patient and their families, among many indicators. This report recommended four strategies: a focus on quality at the national leadership level, error reporting systems, better standards, and the establishment of a safety culture. This report stresses that the U.S. healthcare system is not optimal.

A second report by the IOM in 2001, *Crossing the Quality Chasm*, is a call for immediate action. It provided global recommendations on redesigning healthcare systems to be evidence-based and patient-centered to improve patient care and safety. It recommended six aims for healthcare improvement: safety (patients are not harmed while getting care), effectiveness (evidence-based treatments), patient-centeredness (patient values are included in decision making), timeliness (care is provided when needed), efficiency (reduce or avoid waste), and equity (non-discriminatory access to care).

The report, *Health Professions Education: A Bridge to Quality* (Greiner & Knebel, 2003) was a follow up to *Crossing the Quality Chasm*, which proposed several action items affecting the education of future clinicians. Five competency areas were recommended: patient-centered care, interdisciplinary teams, evidence-based practice, quality improvement, and informatics.

Rising up to the challenge presented by the two documents, *To Err is Human* and *Crossing the Quality Chasm*, the National Academy of Engineering (NAE) and IOM launched a project to look at a system-based approach to healthcare delivery. This was published under the title *Building a Better Delivery System* (Reid, Compton, Grossman, & Fanjiang, 2005). It stressed the importance of looking outside the medical profession for

possible collaboration and solutions. This 2005 report noted that engineering, communications, organizational, and other technological experts and advances can contribute to building a safer and better healthcare system.

The U.S. healthcare system has seen changes since the publication of these landmark studies. For example, quality, patient safety, and satisfaction standards have been enacted for hospitals and providers. Part of Medicaid and Medicare reimbursement depends on satisfying these measures based on requirements set by the Centers for Medicare & Medicaid Services (2016).

With healthcare costs on the rise, dedicating sufficient resources to implement quality improvement initiatives poses a significant challenge for hospitals and the healthcare system in general. With the publication of these landmark studies, physicians and trainees are in the beginning stages of quality improvement education and training necessary to help their patients. A possible path to having practice-ready physicians is quality improvement training during medical school. This potential solution leads to the question: How have medical organizations and medical schools responded to this identified need?

Responses by Medical Organizations and Accreditation Bodies

Many medical organizations and accrediting bodies have focused on the importance of quality improvement in training, as shown in Figure 2. In 2009, the World Health Organization (WHO) developed a *Patient Safety Curriculum Guide for Medical Schools*. This is a comprehensive educational tool composed of two parts: a teacher's guide and a curriculum guide topics. The teacher's guide includes information such as curriculum structure, integration, and resources. The curriculum guide topics include, among others: errors, teamwork, and quality improvement tools. In 2011, the WHO released its "*Multi-professional patient safety curriculum guide*," which recognized that patient safety is a multidisciplinary effort and integration early in the training and education process is key (World Health Organization, 2011). This publication follows the prior guideline in format but with an emphasis on a wider healthcare education application.

The Accreditation Council for Graduate Medical Education (ACGME) and the American Osteopathic Association (AOA) are the governing accrediting bodies for medical residency programs in the United States. All ACGME (2013) and AOA (2015) residency programs include core competencies in practice-based learning and improvement, which includes quality improvement concepts.

In January 2013, the Association of American Medical Colleges (AAMC) published an expert panel's report that recommended incorporating quality improvement/patient safety

2000   *To Err is Human*
Failures in healthcare delivery that resulted in at least 98,000 deaths a year.

2001   *Crossing the Quality Chasm*
Deep crises related to the safety, efficacy, efficiency, and patient-centeredness of healthcare in America.

2005   *Building a Better Delivery System*
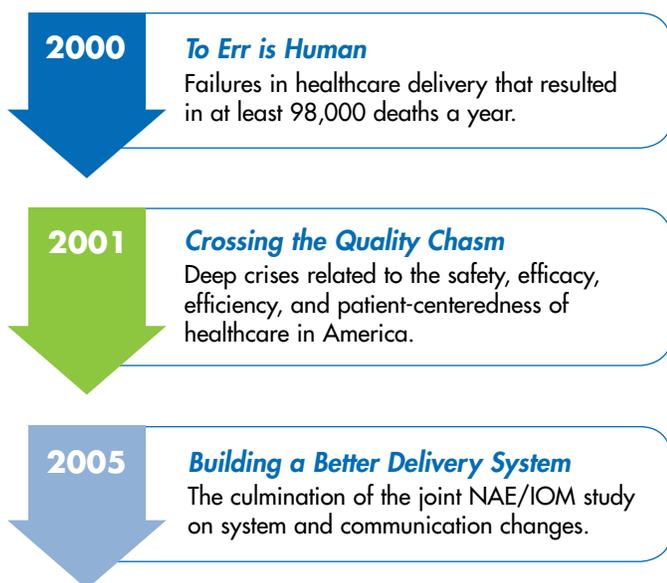The culmination of the joint NAE/IOM study on system and communication changes.

Figure 1: Quality Improvement Seminal Work

(QI/PS) in a continuing education scheme starting with medical school and throughout a physician's career. The AAMC expert panel envisions this integrated, aligned, assessment-based, and lifelong QI/PS training to lead to future changes in healthcare. Part of this effort would include collaboration with other healthcare professions.
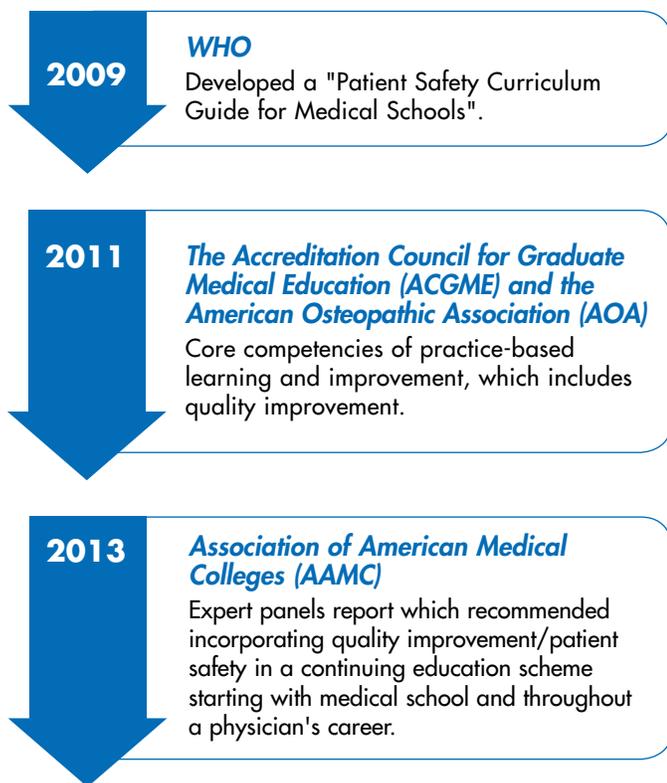
2009 — WHO
Developed a "Patient Safety Curriculum Guide for Medical Schools".

2011 — The Accreditation Council for Graduate Medical Education (ACGME) and the American Osteopathic Association (AOA)
Core competencies of practice-based learning and improvement, which includes quality improvement.

2013 — Association of American Medical Colleges (AAMC)
Expert panels report which recommended incorporating quality improvement/patient safety in a continuing education scheme starting with medical school and throughout a physician's career.

Figure 2: Impact on Medical Curricula

Quality Improvement Knowledge of Trainees

Since these groundbreaking analyses of the U.S. healthcare system and action by both national and international medical organizations, many studies have been published regarding quality improvement training in medical school and residency programs. In what could be the first systematic review of the effect of teaching quality improvement to clinicians, an appraisal of 39 studies involving physicians, nurses, medical and nursing trainees, and other clinicians was conducted (Boonyasai et al., 2007). Many of these studies used adult learning principles and showed that quality improvement knowledge increased through structured curricula. However, further studies were recommended to promote collaboration and determine whether the learnings

have clinical value. Other recommendations included opportunities for and access to resources for experiential learning.

Blasiak et al. (2014) surveyed medical students and found their patient safety and quality improvement knowledge to be generally low. However, those with previous education in the topics fared significantly better. Interestingly, those who had completed or pursued an advanced degree demonstrated higher quality improvement knowledge.

Quality Improvement Curricula, Training, and Resources

Berwick and Finkelstein (2010) considered the current situation as another opportune moment for curricular change, similar to more than 100 years ago when Flexner completed a study which found that critical and immediate change was needed to medical training. Despite recommendations by national and international organizations, published studies on quality improvement training in medical schools indicate variability in training and a need for improvement and consistency. Current trainees need immersion in system- and team-based quality improvement efforts.

For more than 25 years, the Institute of Healthcare Improvement (IHI) has been developing quality improvement training materials and programs, most notably the web-based modules (IHI, About Us, 2016). The IHI conceived the triple-aim agenda for optimum healthcare through improvement of health, experience, and cost. To this end, it offers free, on-demand access to web-based modules and training to medical trainees and faculty (IHI, Open School, 2016).

A systematic literature review conducted by Wong, Etchells, Kuper, Levinson, and Shojania (2010) included 953 possibly relevant English language articles in the literature found in the electronic databases Medline, EMBASE, and HealthSTAR. The articles were published between January 1, 2000 and January 2009. Forty-one curricula were deemed to have met the criteria. These articles were from the United Kingdom, Canada, and the United States. Of these 41 curricula, 34% involved students, 59% involved residents, and 7% related to both students and residents. As criteria, the studies described clear quality improvement or patient safety curriculum goals and teaching methods (Wong et al., 2010). Root cause analysis, systems thinking, and continuous quality improvement were common topics. Based on the findings in the literature, learners' knowledge has been shown by many to improve. Three teaching and training formats were found in the literature: formal curricula; activities that teach specific skills, such as patient hand-offs; and integrating the trainee in day-to-day activity. Challenges to success include

lack of committed teachers, lack of time for both teachers and learners, and an inability to achieve learner buy-in.

Wong, Levinson, and Shojania (2012) published a follow-up article which indicated that in addition to a formal curricula, medical trainees learn quality improvement through two other ways: scenarios that offer specific learning activities (e.g., medical error reporting) and authentic opportunities. Each of these methods have challenges and benefits. The authors recommended increasing faculty trained in quality improvement, determining competency through a comprehensive strategy, and providing seamless training throughout the breadth of medical education.

A recent updated extensive review by Jones, Shipman, and Ogrinc (2015) addressed major characteristics of successful quality improvement curricula. Several databases were searched from 2000 through 2013. Thirty-nine studies met their criteria. Characteristics of successful clinical quality improvement curricula include employing skilled faculty, interweaving theory and practice, and including projects that are integrated into current residency workload, so as not to compete for time.

In a recent pilot program, Brannan, Russ, Winemiller, and Mast (2016) linked medical students with community hospital quality experts to work on hospital initiatives. All hospitals must meet quality standards to qualify for reimbursements from government programs such as Medicare and Medicaid. Small community hospitals are always challenged with increasing costs and having enough resources to implement quality improvement projects. As an osteopathic training program is rooted in community hospital experiences, this mentor and mentee relationship is a natural evolution of a long-term educational partnership. The program provided the needed hands-on training for students while offering a solution to hospital initiatives related to improving patient care and safety.

Discussion and Limitations

The quality improvement education of medical trainees has increased and improved since the publication of several landmark studies. Medical organizations and accreditation bodies have played an important role in promoting the continuous training of future physicians. Many medical training institutions and programs have contributed to this growth, but variability is a challenge. As the training efforts are in early stages, it is critical that more studies are conducted to determine best practices and curricula that result in patient safety and care improvement.

Publications in this overview are in English and English-language publications and resources only and may, therefore, exclude valuable studies published in other languages.

Conclusion and Recommendations

There has been improvement in quality improvement education for medical students from the time *To Err is Human* was published as evidenced by the articles included in the reviews discussed. However, despite recommendations by national and international organizations, published studies regarding quality improvement training in medical schools indicate variability in training and a need for further improvement in quality improvement training. Incorporating web-based training programs also provides another opportunity to close the gap. In addition, a common insight is the need for a continuum of quality improvement training during the entire education of a physician.

Acknowledgment

References:

Accreditation Council for Graduate Medical Education (ACGME). (2013). *Common program requirements.* Retrieved from http://acgme.org/acgmeweb/Portals/0/PFAssets/ProgramRequirements/CPRs2013.pdf.

American Osteopathic Association. (2015). *Basic standards for residency training in osteopathic family medicine and manipulative treatment.* Retrieved from http://www.osteopathic.org/inside-aoa/accreditation/postdoctoral-training-approval/postdoctoral-training-standards/Documents/Basic-Standards-for%20residency%20training-Training-in-FM.pdf.

Association of American Medical Colleges. (2013). *Teaching for quality: integrating quality improvement and patient safety across the continuum of medical education.* Retrieved from https://members.aamc.org/eweb/upload/Teaching%20for%20Quality%20Report.pdf.

Berwick, D. M., & Finkelstein J. A. (2010). Preparing medical students for the continual improvement of health and health care: Abraham Flexner and the new "public interest." *Academic Medicine, 85*(9), S56-S65.

Blasiak, R. C., Stokes, C. L., Meyerhoff, K. L., Hines, R. E., Wilson, L. A., & Viera, A. J. (2014). A cross-sectional study of medical students' knowledge of patient safety and quality improvement. *North Carolina Medical Journal, 75*(1), 15-20.

Boonyasai, R. T, Windish, D. M., Chakraborti, C., Feldman, L. S., Rubin, H. R., & Bass, E. B. (2007). Effectiveness of teaching quality improvement to clinicians: A systematic review. *JAMA: Journal of the American Medical Association, 298*(9), 1023-1037.

Brannan, G. D., Russ, R., Winemiller, T. R., & Mast, E. (2016). Linking community hospital initiatives with osteopathic medical students' quality improvement training: A pilot program. *Journal of the American Osteopathic Association, 116*(1), 36-41.

Centers for Medicare & Medicaid Services. (2016). CMS Quality Strategy. Retrieved from https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/CMS-Quality-Strategy.html.

Greiner, A. C. & Knebel, E. (2003). Institute of Medicine (U.S.) Committee on the Health Professions Education Summit. *Health professions education: A bridge to quality.* Washington, D.C.: National Academies Press. Retrieved from: http://www.ncbi.nlm.nih.gov/books/NBK221528/.

Institute for Healthcare Improvement. (2016). About Us. Retrieved from http://www.ihi.org/about/Pages/default.aspx.

Institute for Healthcare Improvement. (2016). Open School. Retrieved from http://www.ihi.org/education/ihiopenschool/Pages/default.aspx.

Institute of Medicine (U.S.). 2001. *Crossing the quality chasm: a new health system for the 21st century.* Washington, D.C.: National Academy Press.

Jones, A. C., Shipman, S. A., & Ogrinc, G. (2015). Key characteristics of successful quality improvement curricula in physician education: A realist review. *BMJ Quality & Safety, 24*(1), 77-88.

Kohn, L., Corrigan, J. M., & Donaldson, M. S. (2000). *To err is human: Building a safer health system.* Washington, D.C.: National Academies Press.

Reid, P. P., Compton, W. D., Grossman, J., & Fanjiang, G. (2005). *Building a better delivery system: A new engineering/health care partnership.* Washington, D.C.: National Academies Press. Retrieved from http://www.nationalacademies.org/onpi/030909643X.pdf.

Wong, B. M., Etchells, E. E., Kuper, A., Levinson, W., & Shojania, K. G. (2010). Teaching quality improvement and patient safety to trainees: A systematic review. *Academic Medicine, 85*(9), 1425-1439.

Wong, B. M., Levinson, W., & Shojania, K. G. (2012). Quality improvement in medical education: Current state and future directions. *Medical Education, 46*(1), 107-119.

World Health Organization. (2011). *Multi-professional patient safety curriculum guide.* Retrieved from http://apps.who.int/iris/bitstream/10665/44641/1/9789241501958_eng.pdf.

World Health Organization. (2009). Patient safety curriculum guide for medical schools. Retrieved from http://apps.who.int/iris/bitstream/10665/44091/1/9789241598316_eng.pdf.

Grace D. Brannan

Grace D. Brannan, Ph.D. *is a sensory scientist/statistician with more than 20 years of expertise in the areas of sensory science; qualitative and quantitative population-based, behavioral, and public health research studies; quality improvement; design of experiments; and statistics. She has co-authored numerous peer-reviewed publications and has co-authored a book on statistically-based quality measures. Brannan has been an Academician with the International Academy of Quality since 2014. She has conducted many research, sensory, and statistical trainings and presentations globally. She is currently the Research Executive Director for the Centers for Osteopathic Research and Education (CORE) at Ohio University Heritage College of Osteopathic Medicine. She can be contacted at brannang@ohio.edu.*

Quality Approaches in Education

Call For Papers

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

The purpose of this journal is to engage the education community in a discussion of significant topics related to improving quality and identifying best practices in education and workforce development; and expanding the literature specific to quality in education topics. With the increased emphasis on quality improvement in education, *Quality Approaches in Education* engenders a conversation focusing on this topic, supported by manuscripts from the international education community of educators, researchers, and administrators from different disciplines and professions. *Quality Approaches in Education* welcomes submissions of manuscripts from higher education, K-12, and workforce development. The journal also welcomes manuscripts from the student services arena, institutional research, professional development, continuing education, business affairs, and other aspects of education related to quality improvement. We encourage evidence-based analysis using quality approach-driven improvement of education.

The following types of articles fit the purview of *Quality Approaches in Education*:

- Case studies on how to improve quality in a college, school system, or workforce development program using evidence-based analysis, continuous improvement approaches, especially related to improving student retention and degree completion.
- Research articles reporting on survey findings such as a national survey on students' attitudes toward confidence, success, social networking, student engagement, access and affordability, etc.
- Case studies or research articles addressing issues such as the role of faculty, administrators, and trainers in quality systems.
- Case studies or research studies focusing on the role of quality in accreditation.
- Case studies demonstrating best practices and systems thinking in education using the *Baldrige Education Criteria for Performance Excellence*, Lean Six Sigma or other national quality models, standards from the Council for the Advancement of Standards in Higher Education (CAS), or national frameworks and protocols, including preparing K-16 teachers for teaching in the 21st century learning environment.
- Case studies or research studies on scholarship of teaching and approaches to improve teaching, enhancing and supporting student learning, learning outcomes assessment best practices, and best practices for using technology in the classroom.
- Case studies or research studies on how student service units and intervention programs impact the quality of student experience and student learning.
- 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.
- Research studies on how education practices impact the quality of student life and student success for different student populations, including underrepresented groups, first generation in college students, and students from low-income families.
- Case studies that highlight the emerging improvement science for education and the continuous improvement cycle.
- Significant conceptual articles discussing theories, models, and/or best practices related to quality in higher education, K-12, and workforce development.

NOTE: We may dedicate an issue to a special topic to highlight areas of high interest in the field of education.

Articles generally should contain between 3,500 and 5,000 words and can include up to six charts, tables, diagrams, illustrations, or photos of high resolution. For details, please check the "Author Guidelines" at:
http://asq.org/edu/quality-information/journals/

Please send your submissions to:
Dr. Elizabeth Cudney at QAHE@asqedu.org

Quality Approaches in Education

Author Guidelines

Quality Approaches in Education is a double-blind, peer-reviewed journal that is published online by the Education Division of the American Society for Quality (ASQ). The purpose of this journal is to engage the education community in a discussion of significant topics related to improving quality and identifying best practices in education as well as expanding the literature specific to quality in education topics. We will only consider articles that have not been published previously and currently are not under consideration for publication elsewhere.

General Information

Articles in *Quality Approaches in Education* generally should contain between 3,500 and 5,000 words and can include up to six charts, tables, diagrams, photos, or other illustrations. See the "Submission Format" section for more detail.

The following types of articles fit the purview of *Quality Approaches in Education*:

- Case studies on how to improve quality in a college, school system, or workforce development program using evidence-based analysis and continuous improvement approaches, especially related to improving student retention and degree completion.
- Research articles reporting on survey findings such as a national survey on students' attitudes toward confidence, success, social networking, student engagement, access and affordability, etc.
- Case studies or research articles addressing issues such as the role of faculty, administrators, and trainers in quality systems.
- Case studies or research studies focusing on the role of quality in accreditation.
- Case studies demonstrating best practices and systems thinking in education using the *Baldrige Education Criteria for Performance Excellence*, Lean Six Sigma or other national quality models, standards from the Council for the Advancement of Standards in Higher Education (CAS), or national frameworks and protocols, including preparing K-16 teachers for teaching in the 21st century learning environment.
- Case studies or research studies on scholarship of teaching and approaches to improve teaching, enhancing and supporting student learning, learning outcomes assessment best practices, and best practices for using technology in the classroom.
- Case studies or research studies on how student service units and intervention programs impact the quality of student experience and student learning.
- 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.
- Research studies on how education practices impact the quality of student life and student success for different student populations, including underrepresented groups, first generation in college students, and students from low-income families.
- Case studies that highlight the emerging improvement science for education and the continuous improvement cycle.
- Significant conceptual articles discussing theories, models, and/or best practices related to quality in higher education, K-12, and workforce development.

Quality Approaches in Education

Author Guidelines

Manuscript Review Process

We log all article submissions into a database and delete all references to you. These "blinded" versions then go to the editorial review team for comments and recommendations. Both author(s) and reviewers remain anonymous in this process. The review process takes approximately three months during which time the reviewers advise the editor regarding the manuscript's suitability for the audience and/or make suggestions for improving the manuscript. Reviewers consider the following attributes:

1. Contribution to knowledge: Does the article present innovative or original ideas, concepts, or results that make a significant contribution to knowledge in the field of quality in education?

2. Significance to practitioners: Do the reported results have practical significance? Are they presented clearly in a fashion that will be understood and meaningful to the readers?

3. Conceptual rigor: Is the conceptual basis of the article (literature review, logical reasoning, hypothesis development, etc.) adequate?

4. Methodological rigor: Is the research methodology (research design, qualitative or quantitative, methods, survey methodology, limitations, etc.) appropriate and applied correctly? For a conceptual paper, is the framework appropriate and applied correctly?

5. Conclusions and recommendations: When appropriate, are the conclusions and recommendations for further research insightful, logical, and consistent with the research results?

6. Readability and clarity: Is the article well organized and presented in a clear and readable fashion? Is the article written in English and in a grammatically acceptable manner?

7. Figures and tables: When submitted, are the figures and/or tables used appropriately to enhance the ability of the article to summarize information and to communicate methods, results, and conclusions?

8. Organization and style: Is the content of the article logically organized? Are technical materials (survey scales, extensive calculations, etc.) placed appropriately? Is the title representative of the article's content?

9. Attributions: Are the sources cited properly using APA style? Are attributions indicated properly in the reference list?

You should use these attributes as a checklist when reviewing your manuscript prior to submission; this will improve its likelihood of acceptance.

Review Process Outcomes

There are three possible outcomes of the review process:

- Accept with standard editorial revisions. In this case, the content of the article is accepted without requiring any changes by you. As always, however, we reserve the right to edit the article for style.

- Accept with author revisions. An article in this category is suitable for publication, but first requires changes by you, such as editing it to fit our length requirements or providing more detail for a section. We provide specific feedback from our reviewers to guide the revision process.

- Decline to publish. Occasionally articles are submitted that do not fit our editorial scope. We may provide you with suggestions for modifying the article to make it more appropriate to our publication.

Please note that after articles are edited for publication, we return them to you to approve the technical content. A response may be required within 48 hours or the article may be held over for a subsequent issue.

Articles that appear to be advertising or do not fit the general topics addressed by *Quality Approaches in Education* will be rejected without receiving peer reviews.

Quality Approaches in Education

Author Guidelines

1. Articles should emphasize application and implications of what is being presented, whether conceptual or research-based.
   - Use the early paragraphs to summarize the significance of the research.
   - Make the opening interesting; use the opening and/or background to answer the "so what?" question.
   - Spell out the practical implications for those involved in education.

2. Detailed technical description of the research methods or conceptual/theoretical framework is important, but not necessarily of interest to everyone. The description should enhance the narrative or be critical to the understanding of the article's material.

3. Throughout the article, keep sentence structure and word choice clear and direct.

4. Avoid acronyms and jargon that are industry- or organization-specific. Try not to use variable names and other abbreviations that are specific to the research. Restrict the use of acronyms to those that most readers recognize. When acronyms are used, spell them out the first time they are used and indicate the acronym in parentheses.

5. Occasionally, our reviewers and readers view articles that include reference to the author(s) proprietary products or methods as a form of advertising. Although we encourage you to share personally developed theories and application approaches, we ask that you refrain from using our publication as a marketing tool. Please take great care when including information of this nature in your article.

6. If the article cites cost savings, cost avoidance, or cost-benefit ratios, or provides the results of statistical evaluations, include an explanation of the method of calculation, along with any underlying assumptions and/or analysis considerations.

7. Access to any survey discussed in the manuscript is important for our review and must be included with the manuscript. Depending on the length of the survey, we may include the entire survey with the article.

8. When submitting an article that is based on qualitative methodology, please be sure to describe the research questions, the information that is the basis of the data analysis, and report the developing themes. Also remember to include text analysis as part of data analysis. Please include the protocols in a separate Word document; review of the protocols will be important in our technical review. Consider including the protocols in the methodology section of the manuscript, if they can be presented concisely.

9. Our staff does not have the means to compile references or verify usage permissions; therefore, it is important for you to provide all that information with your article, including written letters of authorization when appropriate. Plagiarism is a rapidly growing crime—particularly due to the use of information from the Internet. Please help yourself, and us, to maintain professional integrity by investing the time necessary to verify your sources and to obtain and document all necessary permissions. Information on our requirements for documenting references, along with specific examples, is included at the end of these guidelines.

Quality Approaches in Education

Author Guidelines

Submission Format

1. We accept only electronic submissions in Microsoft Word format. The first page should be a title page with the title, names of the authors, and their affiliations. The second page should be the start of the proposed article with the title and abstract (150 words maximum) at the top of the page. There should be no reference to the author(s) or affiliation in the text that follows. Instead of the name of a university for a case study, the text should state "the University". The margins should be one inch all around on 8½ x 11 pages with Word's one-column format, left-justified. The title and section titles should be 14-point bold Calibri font. The text font should use 11-point Calibri font and a line spacing of 1.5 is preferred.

   Section headings should be 12-point bold Calibri and left justified. Typical section names are: Abstract, Introduction, Background, Literature Review, Methodology, Results, Discussion, Suggestions for Best Practices, Summary or Conclusions, Recommendations, Future Work/Research, Acknowledgments, and References. The actual headings will depend on the focus of the manuscript. There may be two additional levels of sub-headings. The first set of subheadings would be left-justified with the first letter of each word capitalized and in bold, 12-point Calibri. The second level of sub-headings would be the same but in italics.

2. If you are familiar with the APA formatting, we prefer the APA format, but will accept a well-formatted manuscript following these already mentioned guidelines.

3. The manuscript should be between 3,500 and 5,000 words including the abstract, tables, and references. It should include no more than six tables or figures. If you feel strongly that more tables or figures are needed to support the manuscript, we ask that you submit the additional tables or figures and provide an explanation for including them.

4. Tables should be included at the end of the article and must be in Microsoft Word. Each table must be referenced in the article and labeled and centered on a separate line, such as <Insert Table 1 About Here> with the caption for Table 1 on the next line, such as Table 1: Graduation Rate by Major. Do not embed .jpg, .tif, .gif, or tables in other similar formats in your article.

5. Drawings, graphs, and other illustrations should be sent in an email as separate .jpg files with 300dpi; each item should be included in a separate file. All drawings and other illustrations must be referenced in the article, and must be labeled and centered on a separate line, such as <Insert Figure 1 About Here> with the caption for Figure 1 on the next line: "Figure 1: Pareto Analysis of Student Participation in Department Activities."

6. We can use photos if they enhance the article's content. If you choose to submit a photo with your article, it must be a high-resolution .jpg or (at least 300 dpi and at least 4" by 6" in size). Photos should be sent in separate files and referenced in the article. Photos should be accompanied by a complete caption, including a left-to-right listing of people appearing in the photo, when applicable. Do not include any text with the photo file. All persons in the photo must have given permission to have their photo published in *Quality Approaches in Education*.

7. Also submit a separate high-resolution electronic photo (at least 300 dpi) for each author. Author photos should be at least 1" by 2". Author photos should have a plain background, and the author should be facing toward the camera. Please include a separate Word document with a 75- to 100-word biography for each of the authors, mentioning the place of employment, as well as contact information.

Quality Approaches in Education

Author Guidelines

Citations and References

Quality Approaches in Education follows the *6th edition of the Publication Manual of the American Psychological Association*. Citations and references should use the (author's last name, year of publication) notation in a citation in the text and use the APA style.

The reference section should be headed with the section heading of "References" and all references are to be listed alphabetically by the first author's last name. Each reference should list all authors. List the online URL with a hyperlink. Retrieved date is not needed. Here are some examples:

Book examples:

Veenstra, C., Padró, F., & Furst-Bowe, J. (eds). (2012). *Advancing the STEM agenda: Quality improvement supports STEM*. Milwaukee, WI: ASQ Quality Press.

Sorensen, C. W., Furst-Bowe, J. A., & Moen, D. M. (2005). *Quality and performance excellence in higher education*. Bolton, MA: Anken Publishing Company, Inc.

Journal article examples:

Dew, J. (2009). Quality issues in higher education, *Journal for Quality and Participation* 32(1), 4-9. Retrieved from http://asq.org/pub/jqp/past/2009/april/index.html

Plotkowski, P. (2013). Guest commentary: Real-World engineering education: The role of continuous improvement, *Quality Approaches in Higher Education*, 4 (1), 2-4. Retrieved from http://rube.asq.org/edu/2013/05/best-practices/quality-approaches-in-higher-education-vol-4-no-1.pdf

Reference example:

National Science Board. (2012). Science and engineering indicators 2012. Arlington, VA: National Science Foundation. Retrieved from http://www.nsf.gov/statistics/seind10/.

If the authors cite their own work, they should simply state (Author, year) and the same in the reference list (no title) in the initial manuscript (since the reviews are double-blind).

One of the most common errors we have observed with submitted articles is improper referencing due to improper attribution in the text and reference section. Please make sure that all the material in the submitted article is properly referenced and cited as appropriate.

Submission

Send an electronic copy of the Word document of the manuscript including the title page, abstract, text of the manuscript, acknowledgments, and references, with a separate file of any surveys used, separate .jpg files of the figures and photos of authors, and a Word document of the author biographies to Dr. Elizabeth Cudney at QAHE@asqedu.org.

Note on Copyright Transfer

Prior to publication, you must sign a form affirming your work is original and is not an infringement of an existing copyright. Additionally, we ask you to transfer copyright to ASQ. The copyright transfer allows you to reproduce your article in specific ways, provided you request permission from ASQ and credit the copyright to ASQ. The transfer also allows ASQ to reproduce the work in other publications, on its website, etc.

If you use materials from other works in your articles (other than standard references), you must obtain written permission from the copyright owner (usually the publisher) to reprint each item of borrowed material. This includes any illustrations, tables, or substantial extracts (direct quotations) outside the realm of fair use. Submit these permission letters with the article. Articles cannot be published until copies of all permission letters are received.

For example, an article includes a PDSA illustration from a book. The permission statement would include: Figure 1 is from Nancy R. Tague's *The Quality Toolbox, 2nd ed.*, ASQ Quality Press, 2005, page 391. This permission statement would appear in the caption just below the PDSA figure.