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Lecture is a frequently employed method of instruction in institutions of higher education, despite evidence that this method may not be effective in achieving student learning (Stains et al., 2018). "Real-world" experiences are needed to bring classroom concepts to life and foster interconnectedness to enhance students' interpersonal competence (Remington-Doucette et al., 2013). Community service-learning (CSL) projects achieve these objectives and extend student learning opportunities in ways that cannot be accomplished solely within a classroom (Bettencort, 2015). Although health services and quality management routinely use community-based internships and team-based learning (TBL) as educational methods, there are few quantitative studies of student perceptions and subject matter content mastery in our discipline that have evaluated outcomes. A prospective, cross-sectional study was conducted to test the hypothesis that CSL, coupled with the TBL employed in Quality Management and Performance Improvement (QM) and health services practice, is an effective intervention to improve student outcomes. The results of this study suggest that CSL, coupled with TBL, facilitates improved QM and teamwork subject matter content knowledge, effort, engagement, and perception of skill acquisition.

Keywords*: course curriculum design/redesign, public–academic partnerships, service-learning, team-based learning*

El aprendizaje basado en la comunidad mejora los resultados del aprendizaje, la maestría de la materia y el valor percibido de la educación de los servicios de salud: una comparación plurianual a la lección

Las lecciones representan un método de instrucción frecuentemente utilizadas en la educación superior, a pesar de la evidencia indicando que dicho método tal vez no sea efectivo con respecto al aprendizaje estudiantil (Stains et al., 2018). Experiencias del "mundo real" son necesarias para hacer reales los conceptos educativos y para fomentar una interconexión que sirve para enriquecer la competencia interpersonal de los estudiantes (Remington-Doucette et al., 2013). Los proyectos de aprendizaje basado en la comunidad (ABC) cumplen con dichos objetivos y extienden las oportunidades de aprendizaje de los estudiantes a través de experiencias que no pueden ser realizadas dentro del aula (Bettencort, 2015). Aunque los servicios de salud y el manejo de la calidad usan con frecuencia las pasantías basadas en la comunidad y el aprendizaje basado

en equipos o team-based learning (TBL) como métodos educativos, hay muy pocos estudios cuantitativos de las percepciones estudiantiles y de la maestría de la materia de estudio en nuestra disciplina que tienen resultados evaluados. Un estudio potencial y transversal fue llevado a cabo para probar la hipótesis que el ABC, junto con el TBL implementado en el Sistema de Gestión de Calidad (SGC) y la práctica de los servicios de salud, es una intervención efectiva para mejorar los resultados estudiantiles. Las conclusiones de este estudio sugieren que el ABC, junto con el TBL, faciliten una mejora del SGC y de la maestría de la materia del trabajo en equipos, el esfuerzo, el compromiso, y la percepción de la adquisición de una habilidad.

Palabras clave: *el diseño/rediseño de un currículo del curso, las colaboraciones públicas-académicas, el aprendizaje de servicio, el aprendizaje basado en equipos*

Editors' Note: Translation by **Megan J. Myers**
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"Real-world" experiences bring classroom concepts to life and foster interconnectedness to enhance students' interpersonal competence (Remington-Doucette et al., 2013). A form of experiential learning, community service-learning (CSL) projects achieve these objectives and extend student learning opportunities in ways that cannot be accomplished solely in the classroom (Bettencort, 2015).

A central principle of CSL partnerships is that they must be mutually beneficial, e.g., meeting required program and student learning outcomes, and addressing needs of community partners (Harwood & Radoff, 2009). Evidence suggests that service-learning provides mutual benefits (Gray et al., 1998; Schaffer et al., 2015). Community partners in health services need data and quality improvement resources to support their business and public health objectives and requirements. Regulatory changes specific to our discipline, health services, have created community needs that CSL partnerships can help to address. These include mandates by the U.S. Department of Health and Human Services' Centers for Medicare and Medicaid Services (CMS) and Health Resources and Services Administration (HRSA) to improve population health measures such as colorectal and cervical cancer screening (HRSA, 2017). Opportunities to establish and sustain mutually beneficial community–academic partnerships and internships abound. Growing scholarship in this area encourages faculty to engage in CSL by recognizing the importance of fostering applied student learning and external partnerships with agencies and organizations (Comeau et al., 2018; Hamel-Lambert et al., 2012).

Community consulting and service projects using the CSL model are among options to fulfill the Association of University Programs in Health Administration certification requirements for undergraduate programs, such as ours, to include an integrative experience. Further, the curriculum and competencies in our field include QM skills. By employing a CSL approach in our HESA 380: Quality Management and Performance Improvement course, we created a sustainable relationship with Primary Health Solutions (PHS), a Federally Qualified Health Center (FQHC) serving five health centers in Butler County, Ohio. Like many healthcare organizations, PHS uses team-based clinical care practice as well as the generic team-based QM model described in the course textbook, *The Team Handbook* (Scholtes et al., 2018). All QM systems routinely employ structured teams; for example, LEAN, SixSigma, and Plan-Do-Study-Act (PDSA) (Scholtes et al., 2018), as well as the Institute for Healthcare Improvement's Improvement Science curriculum (Institute for Healthcare Improvement, n.d.).

Although health education routinely uses team and community placements during clinical rotations, the effects are not well understood. Zulkifli et al. (2019) studied TBL in medical education; however, hypothesis testing comparing the effects of the intervention in the two groups was not analyzed. Comeau et al. (2018) applied CSL to public health education without hypothesis testing of the intervention. To our knowledge, health services education has not studied CSL quantitatively, nor has the improvement of course content knowledge been tested using standard statistical methods. Further, health education and CSL are continually challenged to innovate, test different models of partnership, and determine ways to respond to university and community partners' needs (Suiter, 2016). To our knowledge, there have been no prospective, multiyear, cross-sectional studies comparing CSL teams to traditional classroom lecture

(TCL), with assessment of student learning outcomes related to objective subject matter (course and team science) knowledge and perception of team competence using statistical hypothesis testing methods. This original research focuses on the application of CSL to improve subject matter knowledge and value in an undergraduate health services QM course. Our overall objective is to promote implementation of CSL as a viable option to improve student learning outcomes in higher education.

Literature Review

Traditional Lecture-Based Classes and Effectiveness

Lecture is a frequently employed method of instruction in institutions of higher education. In a large study by Stains et al. (2018), 2000 classes in science, technology, engineering, and math were monitored, and 55% of classroom interactions consisted of conventional lecture. This has persisted despite evidence that this method may not be particularly effective in achieving student learning. Bunce et al. (2010) found that students self-reported lapses in attention to lectures after very short periods of time and that their attention span declines over the course of a lecture. Samsudin et al. (2016) found that physics students showed enhanced learning outcomes from an active learning model that involved less lecture and more discussion. Frame et al. (2015) found that students felt lecture was less effective than team-based approaches for critical thinking, problem-solving, and examination preparation.

Service-Learning Pedagogy

One of 10 high-impact teaching and learning practices designed to foster student involvement and engagement (Kuh, 2008), service-learning has been established as an effective pedagogy for faculty who desire to integrate both lecture and experiential learning to enhance student learning and development (Mitchell, 2008). Service-learning is a form of experiential education in which students engage in activities that address human and community needs within structured opportunities designed to promote student learning and development (Jacoby & Associates, 1996). Pairing course-based instruction with community engagement, service-learning enhances academic outcomes through student action and reflection and provides exposure to real-world context, resulting in better retention and application of course content (Chupp & Joseph, 2010). Service-learning provides students with "real-world" experience (McLaughlin, 2010, p. 109).

CSL students have the opportunity to address problems in complex settings rather than simplified problems in isolation, allowing them to gain knowledge of the specific context of a service-learning activity and community challenges rather than only draw upon generalized or abstract knowledge from texts (Eyler & Giles, 1999). CSL-related outcomes include, broadly, enhanced civic awareness, growth in personal life skills, academic skills, and job skills (Fogle et al., 2017). Learning in service-learning results from the connections students make between their community experiences and required course learning outcomes (Zivi, 1997). Unlike extracurricular community service, service-learning is a course-based experience that produces the best outcomes when meaningful service activities are related to course material through reflection activities such as directed writings, small-group discussions, projects, and presentations (Bringle & Hatcher, 1996; Bringle et al., 2006).

Integral to service-learning pedagogy are collaborative community partners. In addition to providing opportunities to learn, partners also play an important role in the service-learning process. Their capacity to engage or their inability to do so can result in uneven or ineffective experiences. Thus, faculty retain a significant role throughout the process not only in discerning appropriate service-learning projects for their course but also for maximizing the benefits of the course collaboration to students and community partners (Suiter et al., 2016). Kilgo et al. (2014) remind us that CSL impact is complicated and additional evidence is needed to determine if practices have benefits for student learning outcomes. Although Comeau et al. (2018) assessed the value of CSL to community partners in public health using interviews, a survey tool, thematic analysis and descriptive statistics, no hypothesis testing was designed or undertaken.

Team-Based Learning and Quality Management

Service-learning can be combined with team-based learning (TBL), a method that combines multiple small groups into a larger group setting (Michaelsen et al., 2008). In TBL, the instructor divides the class into smaller groups to work on projects, and they come together periodically to solidify overall learning for the class. In a systematic review, Haidet and others (2014) found that TBL resulted in improved learning acquisition, participation and engagement, and team performance. Additionally, Frame et al. (2015) found that after students experienced TBL, they reported preferring it to traditional classroom lecture-based learning.

The Team Handbook (Scholtes et al., 2018) describes leadership, conflict resolution, project management, and basic quality management tools and skills needed to support team-based learning. Helping student groups to develop and become cohesive is essential if true team learning is to occur. Tuckman (1965) identified four phases (forming, storming, norming, and performing) that groups go through as they learn to work together. When groups first come together, they are characterized by politeness and positivity as the members get to know one another (forming). From there, members push against one another, testing the bounds of the forming stage (storming), and begin to appreciate the full scope of the project. Specifically, the intense work required to complete each project's goals becomes evident during storming. If group one another can get past this and resolve their differences, they begin to appreciate their differences and work together successfully (norming). High-functioning teams are able to work towards and sustain their goals with less friction (performing). Raes et al. (2015) found that when TBL groups get stuck in the first two phases, they tend to learn as fragmented individuals rather than as a united team. It is when they move beyond this into the latter two phases that team learning behaviors are noted, and members begin to learn and deal with their tasks as a team. Therefore, if team-based learning is combined with CSL, the instructor must know how to help student teams progress to the norming stage for aims, deliverables, and deadlines to be met.

TBL in Healthcare

Team-based learning is inherently present in effective QM processes (Institute for Healthcare Improvement, n.d.), and a structured team-based learning approach to QM has effects on the performance of teams in clinical settings a year later (Dixon & Wellsteed, 2019). Understanding QM and its implementation is essential to any well-functioning primary care practice interested in mastering efficiency, improving patient outcomes, and lowering costs. Recent paradigm shifts in healthcare--including public reporting of provider quality data; the transition to value-based reimbursement; and participation in national, state, and regional quality improvement programs--have caused primary care practices to build a culture of quality improvement that places them in a position for success (American Academy of Family Physicians, n.d.).

Benefits of service-learning to students include improved post-university transition, enhanced career preparation, building professional networks, and mentoring partnerships (Perry & Perry, 2015). In health-related disciplines, community-based learning is one documented approach to obtain college and professional competencies (Comeau et al., 2019), and furthers the professional commitment to health promotion and education through research and practice (Rosenstock et al., 2011). A hands-on approach in a real work experience through the use of CSL provides students with an opportunity to learn and use the skills needed for QM processes where collaboration and coordination of care are required and team-based reflection and learning can provide opportunities that facilitate change processes. Students function as QM team members to use QM tools, determine and prioritize potential areas for improvement, lead tests of change, collect and analyze data, communicate results, develop ongoing evaluation plans, and disseminate best practices. These activities met the definition of CSL proposed by Bringle and Hatcher (1996). Although health services and QM routinely use community-based internships and teams, there are few quantitative studies assessing the association of CSL with student perception and with subject matter (content) mastery in our discipline. Zulkifli et al. (2019) assessed the benefits of TBL on medical education. Although benefits to learning and perception were suggested by feedback (on a form), a survey, and trend graphic of module

test score results, no statistical hypothesis testing was used to compare the TBL intervention group to the non-TBL group.

Purpose of This Study

Team-based CSL fits our needs for an integrative experience required for program certification as well as critical thinking, problem-solving, examination preparation, and enhanced academic outcomes needed in health services education. The aims of this study were to evaluate the effectiveness of CSL coupled with TBL as a teaching method; to test the effect of CSL on QM and teamwork subject matter knowledge and perception of skill attainment; and to assess students' engagement with mission-driven community service, in comparison to TCL.

To achieve these aims, we would (1) explore community service-learning as a high-impact pedagogy; (2) redesign the HESA 380 QM course to accommodate a CSL section; (3) design and execute the study. The study would involve collecting demographic and survey data. Groups would be compared to assess potential confounding bias and the possible need for adjustment. Ultimately, we would test the hypothesis that CSL coupled with TBL is an effective intervention compared to traditional classroom lecture to improve student learning outcomes and the perceived value of health services education.

Methods

The Curriculum

HESA380 is an undergraduate course in Quality Management and Performance Improvement. This course was chosen for redesign as a community service-learning course for its focus on current practice application and customer service. In addition, as a Jesuit Catholic university, Xavier expects service and reflection of its students.

Course Description (from the Xavier University Catalog, 2015):

> "Understand and manage quality principles and process management systems in the context of contemporary quality systems, their history and commitment to customer focus. This course gives students a broad-based understanding of quality principles, management systems, place present day quality systems and initiatives in historical context, and manage and modify quality systems to maintain customer focus."

Our community partner, PHS, an FQHC, was interested in partnering for QM projects. PHS identified projects that were mutually beneficial to their organization, student education, and their underserved community. Students participated as QM team members within the primary care practice to implement small tests of change using PDSA cycles in one of several projects. PHS leaders worked with the university to create a model in which projects often spanned more than one semester. Students who chose the CSL section were eligible to continue in subsequent terms as interns. As seniors, they could choose to present their work to the community, submit to professional conferences, and present at the university's annual Celebration of Research and Creativity, which many did.

The Curriculum Redesign

HESA380 was redesigned to focus on QM course content, as well as additional team-based and project management content, and to accommodate the CSL intervention. The CSL intervention for this course is a quality improvement project chosen by and created in collaboration with our local healthcare partner. In Year 1, students were expected to arrange time outside class to complete the CSL project. In Year 2, the course was scheduled to include both course content and CSL. New CSL partnerships were expanded each year. (Current and prior versions of syllabi are available upon request.)

Study Design and Execution

A prospective cross-sectional study was designed, and the following research hypotheses were specified:

Section 1 is comparable to Section 2. Comparability testing is required prior to testing the primary research hypothesis: CSL, coupled with TBL, is an effective intervention to improve student learning outcomes, compared to TCL.

Before conducting the research with CSL participants, the investigators submitted the research protocol to the university's Institutional Review Board and were given exempt status approval. After approval, 94 students were enrolled in 2 sections of Quality Management and Performance Improvement, a junior- or senior-level course in the undergraduate Bachelor of Science in Health Services Administration at Xavier University, Cincinnati, Ohio during the period January 2015 to May 2017. All students in both sections are Year 3 or 4 undergraduates, ages 19–22. Section 1 employed a TCL format, without CSL, used in the previous years. Students in this section received information about quality management and team functioning and performance via lecture method (i.e., learning about team development and functioning), but did not engage in team-based learning or do field-based service-learning. Section 2 combined lecture, classroom activities, computational exercises, and considerable discussion, both in class and via an online discussion board. Variable methods were employed to accommodate thinkers and doers, introverts and extroverts, and learning preferences. Our community partner noted:

> "You also [attempted] to find the best fit for each student, in terms of placement. You considered the interests of the students, their skills sets and where they fell on the continuum of learning. We thought about timing and stress levels of the practice manager, staff and providers at each location when we placed students. Maybe in the world of education these things are assumed when you are working with and placing students, but for the ebb and flow of the real-world work experience as it relates to integrating students and their learning, this might be worth calling out." (A. E. Eberhart, personal communication, September 17, 2019)

Consulting projects were chosen by our clinical healthcare community partner. Students in the CSL group were divided into teams and placed at five separate health centers. Again, our community partner noted:

> "We had one group of 4-5 students and discovered that a better size for learning and working with the staff and providers was 1-2 or maybe 3 students. The students in the larger group were a bit bored and felt 'in the way' and the staff wasn't able to effectively manage that many students who were present at the same time." (A. E. Eberhart, personal communication, September 17, 2019)

Teams were assigned to collect, investigate, and present baseline data for immunizations, dental, vision, colorectal or cervical cancer screening. When appropriate, teams assisted the community partner to implement a standard QM Plan-Do-Study-Act iterative rapid improvement cycle.

Comparison of Groups to Assess Potential Confounding and Assess Need for Adjustment

Students self-selected their enrollment in either the TCL or CSL section. We expected that the two sections would not be statistically different with respect to sex, race, age, or grade point average (GPA). T-tests and either chi-square or Fisher's exact tests at $p = 0.05$ were used to test comparability of the TCL and CSL sections, based on sex, race, and GPA for all students enrolled. Comparability of the two groups allowed testing of the intervention.

The Intervention: Community Service-Learning as a Teaching Method

Relative to the TCL section, improved learning outcomes in the CSL section were anticipated. Improved learning was defined as a significantly higher score on a summative survey assessing Quality Management content. As described previously, the CSL section of the course was redesigned to retain common content, meet CSL criteria, and accommodate a CSL experience. In addition to the existing lecture-based student

learning outcomes (SLO), only one additional SLO was added: "Plan and execute process improvement methods to address and improve community needs." Of necessity, CSL was coupled with TBL practice as an effective intervention to improve student outcomes. This coupling is addressed in Study Limitations. The intervention section is called "CSL." Typical of QM instruction, students received instruction in team science, including frequently reinforced expectations to function as team members within their small project team of classmates, with the full class, with the instructor, and with staff at their community partner site.

The Survey

At each semester's end, students in both sections were administered the anonymous survey to assess attitudes and subject matter content knowledge of QM. The survey was administered via Survey Monkey® to students in both the TCL and the CSL groups. The survey assessed students' knowledge of quality management curriculum, perceptions of readiness to use skills, and preference for type of learning experience. A teamwork subdomain was created to test for differences among teams on content mastery, teamwork, perception of skill, and attitudes. A five-point scale was developed for students to rate themselves, in which 3 = "Neither Agree nor Disagree." Thirty-six objective and applied subject matter and discipline-specific content questions were based on common readings and the application of content shared by both sections, referred to as "content." The content domain was not created as a comprehensive examination; rather, it was created to test and apply concepts and readings common to both sections. The 36-item summative Content Domain Score is reported as percent ± standard deviation with 95% confidence intervals. The teamwork subdomain included two perception-of-skill questions, an eight-item subset of content questions related to team phases and roles, problem solving (one perception of skill question and a subset of applied case study questions), and perception-of-skill related to presentations to executive leadership. The terms QM, quality improvement, performance and process improvement are often used interchangeably. Examples of survey questions are in the Results section tables.

Students in the CSL section were surveyed regarding their individual attendance, effort, and contribution to their community partner. Attendance was corroborated by the instructor. (The survey is available upon request.)

Statistical Analysis Plan

T-tests and chi-square or Fisher's exact tests at $p = 0.05$ were used to test survey variables and suites of variables hypothesized to differ significantly between course sections. SAS JMP Pro® 13.2.1 was used for data management, analysis, and graphics for Figures 1 and 2.

Content questions were scored as correct or incorrect; the percentage of correct responses was calculated for each participant. Subjective questions were collapsed from a 5-point scale to the desired response (1 = *Agree*, or *Strongly Agree*) versus the undesired response (0 = *Neither Agree nor Disagree*, or *Disagree* or *Strongly Disagree*), with bias in favor of the null (that CSL is no better than TCL).

A derived variable, "TeamworkPercent2," was created using the subgroup of 8 questions testing knowledge of team phases and team roles: $\left(\frac{Number\ of\ questions\ answered\ correctly}{8}\right) x100$

Results

Survey Response

The survey response rate was 83/94 = 88%, equivalent to the percentage of students who completed the course. (One student withdrew from the course prior to the survey.)

Comparability of Groups

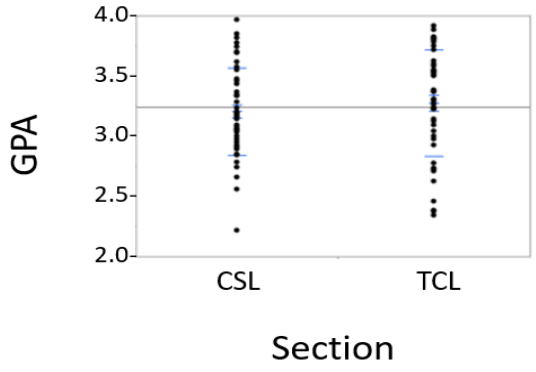
As shown in Table 1 and Figure 1, the CSL and TCL groups are comparable in terms of gender, race, and GPA. There were 29 White students in the CSL section, and 28 White students in the TCL section. Black, Asian, Hispanic, Native Hawaiian/Pacific Islander and mixed race individuals numbered 5, 4, 4, 1, 2 (total = 16) in the CSL group, and 2, 1, 1, 0, 1 (total = 5) in the TCL group, respectively. Students of unknown race numbered 4 in CSL and 13 in TCL.

Table 1
Comparability of the Groups

Variable of Interest	Value	Section		Test
		CSL	TCL	*p*-value
Sex (frequency, %)	Female	30/49 = 52%	27/46 = 48%	0.80
Race (frequency)	Unknown	4	13	0.91
	White	29	28	
	Black	5	2	
	Asian	4	1	
	Hispanic	4	1	
	Native Hawaiian, Pacific Islander	1	0	
	Mixed	2	1	
GPA (4.0 Scale) (Mean ±SD		3.21±0.36	3.28±0.44	0.40

Note. CSL section: n = 41; TCL section: n = 42; Frequency *p*-values analyzed by Pearson Chi-square, or Fisher's Exact (FE) for cells < 5. Tests of means by t-test. Two-tailed *p*-values are reported. Race/ethnicity is self-reported; "Mixed" denotes student self-report of > 1 race/ethnicity; "Unknown" denotes non-reported.

Figure 1
GPA by Section

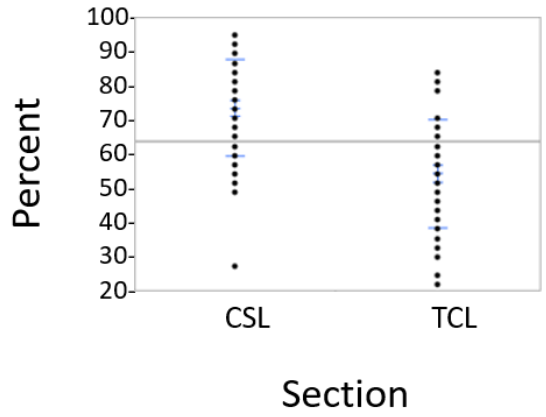


Note. GPA at start of course, by section. Reference line at 3.24 is the mean of means. No statistical difference in GPA between the two groups demonstrates the two groups are comparable.

Community Service-Learning Intervention Improves Course Content Mastery

On average, students in CSL sections scored 19 percentage points higher on a 36-question final content survey, compared to their TCL section counterparts ($p < 0.0001$). The 36-item summative Content Domain Score is reported as the percentage correct (standard deviation) or 95% confidence interval, denoted as CI_{95}. The mean score among 41 students in the CSL section was 73.37% (14.14) CI_{95} 68.91-77.83, while the mean score among the 42 students in the TCL section was 54.25% (15.79) CI_{95} 49.33-59.17. Thus, the CSL intervention produced a 19% improvement in learning (Figure 2; Table 2).

Figure 2
Summative Content Domain Score by Section



Note. Summative Content Domain Score (percent); n = 36 questions. CSL section (n = 41) mean score: 73.37% (14.14) CI_{95} 68.91-77.83. TCL section (n = 42) mean score: 54.25% (15.79) CI_{95} 49.33-59.17. Reference line at 63.81 is the mean of means. The two groups are significantly different ($p < 0.0001$). The CSL intervention produced a 19% improvement in learning.

Table 2
Summative Content Domain Score by Section

Question	CSL (n = 41)	TCL (n = 42)	*p*-value (two-tailed)	Difference
Score (Mean percent ±SD)	73.37% (±14.14)	54.25% (±15.79)	$p < 0.0001$	19.12%
95% Confidence Interval	68.91-77.83	49.33-59.17	Non-overlapping	Non-overlapping

Community Service-Learning Intervention Improves Teamwork Domain

As shown in Table 3, 90% of students in a community service-learning partnership agreed strongly or somewhat agreed that service-learning helped them learn to work better in a team, compared to 40% in a traditional lecture format.

Importantly, students' self-reported team skills were validated by objective performance on the Teamwork domain in the summative survey assessment. Students in Consulting Teams performed 25% (mean) higher ($p < 0.0001$) on knowledge of team phases (Table 3) and roles, compared to traditional lecture.

Table 3
Teamwork Domain Outcomes by Section

Question	CSL	TCL	Difference	*p*-value
Objective content:	mean score (SD)	mean score (SD)	(percent)	(two-tailed)
Teamwork domain	78.05% (22.50)	53.27% (22.44)	25%	< 0.0001
Subjective self-reports, teamwork:				
This class helped me to learn to work better with others in a team.	90.24% (30.00)	40.48% (±49.68)	50%	< 0.0001
I would feel comfortable working on or leading a team on a process improvement project.	87.80% (33.13)	61.90% (49.15)	26%	0.006
I would feel comfortable presenting process improvement results and recommendations to healthcare executives and providers.	87.80% (33.13)	59.52% (49.68)	28%	0.003
Subjective self-reports, other:				
I understand how process improvement procedures are applied in real healthcare organizations.	97.56% (15.62)	83.33% (37.72)	14%	0.028
I felt engaged in this class and curriculum more than in other classes I have taken.	82.93% (38.09)	54.76% (50.38)	28%	0.005

Note. CSL section is the new experiential learning capstone course section. CSL section: n = 41; TCL section: n = 42. Frequency *p*-values analyzed by Pearson Chi-square, or Fisher's Exact (FE) for cells < 5. Two-tailed *p*-values are reported for the desired response with significance level $p < 0.05$.

Engagement at Community Site

All CSL students viewed their contribution positively (Table 4).

Table 4
CSL Engagement at Community Site

Survey item	CSL Frequency (%)
I attended all site visits.	95
At the site, I made a personal effort to learn about the organization and what they do.	100
Our class contributed to the site in a positive way.	100

Note. CSL section is the new experiential learning capstone course section. CSL section: n = 41; self-reported attendance was confirmed by the instructor's attendance roster.

Based on self-report, individual students in the CSL group attended their planned site visits 95% of the time. Self-reported attendance was corroborated with the instructor's attendance roster. All students reported expending personal effort to learn about the organization's mission. This effort was evidenced in their final slide presentation. Further, 83% of students in the CSL section reported, "I felt engaged in this class and curriculum more than in other classes I have taken," ($p = 0.005$) compared to 55% of students in TCL.

Incidental Findings of Perception and Competence

Although students self-selected their group, CSL is not for everyone, and neither is lecture. At the course conclusion, there was no significant difference between the groups amongst students expressing a desire to be in the other group ($p = 0.45$). There were no significant differences between students in the CSL and TCL sections, who reported that "course and assignments meet the HSA student learning objectives listed in the syllabus", and "the time, work and thought I put into the papers was appropriate for a 3-credit course." Students in both sections report, "I like and am interested in process improvement."

Students' self-perceived competence did not differ between the two sections. There were no significant differences between CSL and TCL when students were prompted: "I feel that my depth of understanding of process improvement techniques is good," and "If given a healthcare-related process improvement issue to solve in a healthcare organization, I feel confident that I would know how to proceed." However, as reported in Table 3, when asked further validation questions to ascertain if they would "feel comfortable working on or leading a team on a process improvement project," (26% difference; $p = 0.006$) or "comfortable presenting process improvement results and recommendations to healthcare executives and providers" (27% difference; $p = 0.003$), students in the CSL section reported statistically significantly higher comfort levels. Further, self-report by students in CSL regarding "how process improvement procedures are applied in real healthcare organizations" was 14% higher compared to TCL ($p = 0.028$).

Limitations

Small sample size was a study limitation and may influence the reliability of some statistical tests (e.g., race). To our knowledge, there is no validated instrument to assess CSL per se.

Students self-selected their preferred section (CSL or TCL); this study design does not assess or address individual learning styles, nor which placement may be optimal for each student. Some students may perform less well on tests of content knowledge, or perceive greater difficulty in the CSL milieu. Convenience cannot be excluded as a factor, however, results showed that there was no significant difference between the groups amongst students expressing a desire to be in the other group. Opdecam et al. (2014) found that a subgroup of higher-achieving students preferred lecture-based learning over team-based learning, even though team-based learning was found to relate to better overall academic success in the course they studied. This suggests that students do not always favor methods that are more effective. Students in this study were afforded the opportunity to choose their section.

Team skills are measured as summative content knowledge, perception of skill and comfort level, as well as project deliverables. Team science is taught in both sections, however, teamwork is implicit in a healthcare setting, and experiential teamwork effects cannot be separated from CSL effects. To tease apart the separate effects of CSL and TBLP, a paired study design with complex modeling is needed. Structural equations modeling (SEM) using Mplus meets this need. Briefly, SEM, or path analysis, models examine the covariance within and between paired participants. By jointly estimating effects in each pair, variation can be partitioned into the CSL, TCL, and TBL components. SEM is commonly employed in the social and psychological sciences to partition subtle effects. Twin studies are one such example (Alexander et al., 2014). SEM has the added advantage of modeling multiple measured quantitative factors on several conceptual factors, creating models within models. Independent observation by an expert in team-based learning assessment was not done. However, community partner involvement in the study supports content validity, as does extensive prior professional practice of faculty.

Although the results of this study support the conclusion that CSL leads to improved learning when compared to TCL, there are limitations inherent to research of this nature that must be acknowledged. Steps were taken to minimize differences between the CSL and TCL sections of HESA 380 outside of course instruction methodology, such as using a common text, testing for confounding student variables (i.e., GPA), and focusing on a shared curriculum. However, completely controlling all potentially confounding variables in actual classroom (non-lab) situations is very difficult, and other variables that could not be controlled could impact the results (i.e., student internal motivation for the topic, unique classroom dynamics related to student personalities). This is a single institution and single course study. As such, results of this study may not be generalizable to other courses, institutions, or fields of study.

Next Steps for Curriculum Development

Survey tools are needed for site assessment by students and also community partners' assessment of deliverables and students' performance. Further study of the teamwork domain is needed to determine if students do, indeed, achieve project aims better in team-based CSL. A validated tool is needed to assess team skills and outcomes.

Conclusions

CSL, Coupled with TBL, Improves Subject Matter Content Knowledge, Compared to TCL

A community service-learning capstone consulting project was successfully applied to undergraduate education. Students were permitted to self-select into either a traditional, lecture-based course or a CSL style course, and the resulting groups were similar in terms of student demographics and baseline GPA. Small sample size (n = 94) is a previously stated limitation. The CSL group showed 19% improvement ($p < 0.0001$) in learning outcomes related to QM course content, compared to TCL. This is important, as many studies are limited in that they show difference in preference or attitude as opposed to actual learning. In this study, students utilized standard QM tools and strategies to collect, analyze, and present baseline quantitative and qualitative data to healthcare providers and executives. CSL is increasingly being adopted as a pedagogical approach to achieve improved student learning outcomes across a variety of disciplines (Kenworthy-U'Ren, 2008). With ever-increasing evidence suggesting that lecture is not the best method of instruction in many cases, it is easy to question why its use continues to be so prevalent. When objective assessment of subject matter content is applied, this study demonstrates quantitatively that CSL+TBL is superior to TCL.

CSL, Coupled with TBL, Improves Teamwork Knowledge and Perception

Results from the teamwork domain support the hypotheses that CSL methods lead to improvement in both content mastery and self-perception of team skills. Compared to traditional lecture, students in consulting teams performed 25% (mean) higher ($p < 0.0001$) on the teamwork domain of the summative survey assessment. In addition to objective assessment of team science, students in consulting teams reported feeling well prepared to work in teams and interact with administration, providers, and staff.

Self-Report and Perception Require Additional Validation

Students in both sections reported that they have attained a high level of content mastery from taking HESA 380. However, students in the CSL section reported a higher level of comfort in using the content they mastered while actually working, leading, and presenting team projects to external community partners in real healthcare organizations. This would seem to support a higher level of mastery of knowledge for CSL students, as feeling ready to utilize knowledge in the world suggests a greater degree of learning. However, self-report and perception are insufficient to assess actual learning and proficiency. Validated tools to assess

discipline-specific content mastery are needed to demonstrate that CSL actually prepares students to use their knowledge more effectively in the field when compared to TCL methods.

CSL Creates Public–Academic Partnerships and Connects Mission-Driven Community Impact to Academic Performance

All CSL students reported expending personal effort to learn about their community partner's mission and population. All students felt that their contribution was needed and positive. This was evidenced by 95% attendance at scheduled work days and 100% attendance at presentations to community leadership. Students in the CSL group were engaged and perceived that they contributed positively to the community partner's mission via a project of the community partner's choosing.

In addition to gains in subject matter knowledge, 83% of students in the CSL team section reported, "I felt engaged in this class and curriculum more than in other classes I have taken" ($p = 0.005$), compared to 55% of students in TCL. When compared to TCL, this study suggests that CSL, coupled with TBL, facilitates improved QM and teamwork subject matter content knowledge, effort, engagement, and perception of skill acquisition.

Lessons Learned and Implications for Future Studies

While exploring CSL as a high-impact teaching method and redesigning a course, we learned many lessons about the expanded role of faculty in a co-teaching model. In this course, consulting teams supported the work of PHS to provide increased value to their underserved and underinsured FQHC community, consistent with Xavier University's mission. PHS, our community healthcare partner, is now poised to meet requirements for CMS and FQHC qualification to improve outcomes for their population.

The curriculum redesign required an appropriate course and the addition of SLOs or additional courses to support real-world work. Lessons learned are as follows:

1) Preparation for CSL: Initially, we found that some students' limited skills in writing, oral communication, and math made their project progress seem more difficult. For example, preparatory projects with data may be needed if a quantitative course is chosen for redesign. It was helpful that updated core course requirements occurred concurrently at our university.

2) In their Student Course Evaluations, students frequently mentioned the value of simple team-building activities completed during class. To demonstrate specific concepts, additional team activities were added each term throughout the study period. Although these activities reinforce the coupling of CSL-TBL, student evaluations continued to improve.

3) Clearly identified individuals willing to serve as on-site mentors improve student perception and project success.

4) During the study period, a variable credit independent study course was added for interested students to present their work orally or as a poster at the university's Celebration of Research and Creativity, held each spring. Students value a portfolio to enhance their employment prospects and interview experience. In 5 years, 25 students have chosen to participate in the independent study course, and present their work. In addition, three students have co-authored published manuscripts or successful grants. Importantly, this experience allows students who did not enter the program as "Honors" students to have a similar experience and credentials.

5) Following the study period, we separated the content course from the CSL. Separating the course itself, with its preparatory content, from the practicum allowed easier identification and correction of specific "pain points" for students, mentors, and instructors. A variable credit CSL internship was added to accommodate projects of varying scope, length, difficulty, and location. This change to the curriculum encourages students to continue as trainers for the incoming team. In addition, faculty have clear examples of student initiative and deliverables to use in letters of reference.

Students have clear examples of challenges and successes to describe during interviews with employers.

At Commencement, University Communications asked students, "What was one experience from your major that resonated with you?" One study participant told them, "As part of the major's capstone class, [we] gave a presentation to over 20 health-care executives at a community partner site focusing on a semester-long quality improvement project. This experience forced me to reflect on all of the classes in the major such as Healthcare Management, Law and Ethics, Reimbursements, Health Data Management, and Public Health. We were thrown into a "real" situation that moved outside the classroom and had real implications for a real company.

6) Multiculturalism and diversity: Content for multiculturalism, confidentiality, and community service-learning are part of the curriculum. Practice was required during the oral presentation practices for awareness and mastery of sensitive language.

7) Xavier University recently added a CSL course attribute to the Course Catalogue. (A Definition of Service Learning attribute, with student learning outcomes guidance for instructors, is available on request.)

Gaps Suggest Future Studies

Future studies are needed to address knowledge gaps related to students, faculty, employers, and community impact. A study is needed to identify characteristics of students who choose CSL and other high-impact teaching and learning options, compared to students who choose TCL. A study by Sterk Barrett and Jenkins (2018) identified a subgroup of students of color who reported enhanced learning in an applied contextual learning environment. Our experience suggests this area of research warrants further study. CSL and team development requires additional time and effort by the instructor. To tease apart the separate effects of CSL+TBL, a paired study design with complex modeling (e.g., SEM) is needed. Assessment is needed to determine current specialty employers' anticipated needs for a workforce with quantitative, analytic, graphic, and project management skills to achieve community impact in complex systems. CSL is complex and requires identification of outcomes for each organization, the course and program, and the community itself. Mission-driven outcomes studies are needed to demonstrate improved community outcomes and impact. Further, new public–academic partnerships, connecting mission-driven community impact to academic performance, warrant further study.

We are reminded that while high-impact practices such as service-learning have demonstrated an impact on undergraduate student learning as a whole, the nature of impact is complicated and additional empirical evidence is necessary to determine if practices have vast benefits for student learning outcomes (Kilgo et al., 2014).

In summary, results suggest that students engaged in CSL, coupled with TBL, learned and retained subject matter content more effectively than those experiencing only TCL, valued their CSL experience, and felt better prepared for real-world work. Although much research is yet to be done, this research demonstrates improved QM and teamwork content knowledge, and perception of value, when CSL+TBL is employed. High student attendance, effort, and perceived positive contribution suggest shared community-academic mission is linked to higher academic performance.

References

Alexander, E. S., Martin, L. J., Collins, M. H., Kottyan, L. C., Sucharew, H., He, H., Mukkada, V.A., Succop, P. A., Abonia, J. P., Foote, H., Eby, M. D., Grotjan, T. M., Greenler, A. J., Dellon, E. S., Demain, J. G., Furuta, G. T., Gurian, L. E., Harley, J. B., Hopp, R. J., Kagalwalla, A., Kaul, A., Nadeau, K. C., Noel, R. J., Putnam, P. E., von Tiehl, K. F., & Rothenberg, M. E. (2014). Twin and family studies reveal strong environmental and weaker genetic cues explaining heritability of eosinophilic esophagitis. *Journal of Allergy and Clinical Immunology, 134*(5), 1084–1092. https://doi.org/10.1016/j.jaci.2014.07.021

American Academy of Family Physicians. (n.d.). *Basics of quality improvement.* https://www.aafp.org/practice-management/improvement/basics.html

Bettencourt, M. (2015). Supporting student learning outcomes through service learning. *Foreign Language Annals*, *48*(3), 473–490. https://doi.org/10.1111/flan.12147

Bringle, R. G., & Hatcher, J. A. (1996). Implementing service learning in higher education. *The Journal of Higher Education, 67*(2), 221–239. https://doi.org/10.1080/00221546.1996.11780257

Bringle, R. G., Hatcher, J. A., & McIntosh, R. E. (2006). Analyzing Morton's Typology of Service Paradigms and Integrity. *Michigan Journal of Community Service Learning, 13*(1), 5–15

Bunce, D. M., Flens, E. A., & Neiles, K. Y. (2010). How long can students pay attention in class? A study of student attention decline using clickers. *Journal of Chemical Education*, *87*(12), 1438–1443. https://doi.org/10.1021/ed100409p

Chupp, M. G., & Joseph, M. L. (2010). Getting the most out of service-learning: Maximizing student, university and community impact. *Journal of Community Practice*, *18*, 190–212. https://doi.org/10.1080/10705422.2010.487045

Comeau, D. L., Palacios, N., Talley, C., Walker, E. R., Escoffery, C., Thompson, W. W., & Lang, D. L. (2019). Community-engaged learning in public health: An evaluation of utilization and value of student projects for community partners. *Pedagogy in Health Promotion*, *5*(1), 3. https://doi.org/10.1111/flan.12147

Dixon, N., & Wellsteed, L. (2019). Effects of team-based quality improvement learning on two teams providing dementia care. *BMJ Open Quality*, *8*(2), e000500. https://doi.org/10.1136/bmjoq-2018-000500

Eyler, J., & Giles, Jr., D. E. (1999). *Where's the learning in service-learning?* Jossey-Bass.

Fogle, E. M., Franco, S. D., Jesse, E. M., Kondritz, B., Maxam, L., Much-McGrew, H., McMillen, C., Ridenour, C. S., & Trunk, D. J. (2017). Served through service: Undergraduate students' experiences in community engaged learning at a Catholic and Marianist university. *Journal of Catholic Education*, *20*(1). https://doi.org/10.15365/joce.2002062017

Frame, T. R., Cailor, S. M., Gryka, R. J., Chen, A. M., Kiersma, M. E., & Sheppard, L. (2015). Student perceptions of team-based learning vs traditional lecture-based learning. *American Journal of Pharmaceutical Education, 79*(4), 51. https://doi.org/10.5688/ajpe79451

Gray, M. J., Ondaatje, E. H., Fricker, R., Geschwind, S., Goldman, C. A., Kaganoff, T., & Klein, S. P. (1998). *Coupling service and learning in higher education: The final report of the evaluation of the Learn and Serve America higher education program*. RAND Corporation.

Haidet, P., Kubitz, K., & McCormack, W. T. (2014). Analysis of the team-based learning literature: TBL comes of age. *Journal on Excellence in College Teaching, 25*(3 & 4), 303–333.

Hamel-Lambert, J. M., Millesen, J. L., Slovak, K., Harter, L. M. (2012). Reflections on community-engaged scholarship faculty development and institutional identity at Ohio University. *Journal of Higher Education Outreach and Engagement*, *16*, 129–148.

Harwood, A. M., & Radoff, S. A. (2009). Reciprocal benefits of mentoring: Results of a middle school–university collaboration. In B. E. Moely, S. H. Billig, & B. A. Holland (Eds.), *Advances in service-learning research* (Vol. 9, Creating our identities in service-learning and community engagement) (pp. 131–158). Information Age.

Health Resouces and Services Administration. (2017). *2017 Butler County Community Health Corsortium, Inc DBA Primary Health Solutions Health Center program awardee data.* Retrieved August 16, 2019, from https://bphc.hrsa.gov/uds2017/datacenter.aspx?q=d&bid=0534830&state=OH&year=2017

Institute for Healthcare Improvement. (n.d.). *Science of improvement: Forming the team.* Retrieved August 16, 2019, from http://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementFormingtheTeam.aspx

Jacoby, B., & Associates. (1996). *Service-learning in higher education: Concepts and practices*. Jossey-Bass.

Kenworthy-U'Ren, A. L. (2008). A review of the field of ten years after JOBE's seminal special issue. *Journal of Business Ethics*, *81*, 811–822. https://doi.org/10.1007A10551-007-9549-3

Kilgo, C. A., Ezell Sheets, J. K., & Pascarella, E. T. (2015). The link between high-impact practices and student learning: Some longitudinal evidence. *Higher Education*, *69*(4), 509–525. https://doi.org/10.1007/s10734-014-9788-z

Kuh, G. (2008). *High-impact educational practices: What they are, who has access to them, and why they matter*. Association of American Colleges and Universities.

McLaughlin, E. (2010). The "real-world" experience: Students' perspectives on service learning projects. *American Journal of Business Education*, *3*(7), 109–117.

Michaelsen, L. K., Sweet, M., & Parmelee, D. X. (2008). *Team-based learning: Small group learning's next big step*. Jossey-Bass.

Mitchell, T. D. (2008). Traditional vs. critical service-learning: Engaging the literature to differentiate two models. *Michigan Journal of Community Service Learning*, *14*(2), 50–65.

Opdecam, E., Everaert, P., Van Keer, H., & Buysschaert, F. (2014). Preferences for team learning and lecture-based learning among first-year undergraduate accounting students. *Research in Higher Education*, *55*(4), 400–432. https://doi.org/10.1007/s11162-013-9315-6

Perry, A. L., & Perry, L. G. (2015). Final-year transition and service-learning: Working together as a vehicle for student engagement, development, and life preparedness. *International Journal of Research on Service-Learning and Community Engagement*, *3*(1). https://journals.sfu.ca/iarslce/iarslce/index.php/journal/article/view/153/82

Raes, E., Kyndt, E., Decuyper, S., Van den Bossche, P., & Dochy, F. (2015). An exploratory study of group development and team learning. *Human Resource Development Quarterly, 26*(1), 5–30. https://doi.org/10.1002/hrdq.21201

Remington-Doucette, S. M., Connell, K. Y., Armstrong, C. M., Musgrove. L. S. (2013). Assessing sustainability education in a transdisciplinary undergraduate course focused on real-world problem solving. *International Journal of Sustainability in Higher Education, 14*(4), 404–433. https://doi.org/10.1108/IJSHE-01-2012-0001

Rosenstock, L., Helsing, K., & Rimer, B. K. (2011). Public Health education in the United States: Then and now. *Public Health Reviews*, *33*(1), 39–65.

Samsudin, A., Suhandi, A., Rusdiana, D., Kaniawati, I., & Costu, B. (2016). Investigating the effectiveness of an active learning based-interactive conceptual instruction (ALBICI) on electric field concept. *Asia-Pacific Forum on Science Learning & Teaching*, *17*(1). https://doi.org/10.1111/j.1756-8765.2008.01005.x

Schaffer, M. A., Hargate, C., & Marong, K. (2015). Engaging communities in nursing education. *International Journal of Research on Service-Learning and Community Engagement*, *3*(1), 11.

Scholtes, P. R., Joiner, B. L., & Streibel, B. J. (2018). *The team handbook* (3rd ed.). GOAL/QPC.

Stains, M., Harshman, J., Barker, M. K., Chasteen, S. V., Cole, R., DeChenne-Peters, S. E., Eagan, M. K., Esson, J. M., Knight, J. K., Laski, F. A., Levis-Fitzgerald, M., Lee, C. J., Lo, S. M., McDonnell, L. M., McKay, T. A., Michelotti, N., Musgrove, A., Palmer, M. S., Plank, K. M., ... & Young, A. M. (2018). Anatomy of STEM teaching in North American universities. *Science*, *359*(6383), 1468–1470. https://doi.org/10.1126/science.aap8892

Sterk Barrett, M., & Jenkins, I. (2018). Service-learning: A powerful pedagogy for promoting academic success among students of color. *International Journal of Research on Service -Learning and Community Engagement*, *6*(1), Art. 16. https://ijrslce.scholasticahq.com/article/6964-service-learning-a-powerful-pedagogy-for-promoting-academic-success-among-students-of-color

Suiter, S. V., Thurber, A., & Sullivan, C. (2016). A co-learning model for community-engaged program evaluation. P*rogress in Community Health Partnerships: Research, Education, and Action*, *10*(4), 551–558. https://doi.org/10.1353/cpr.2016.0063

Tuckman, B. W. (1965). Developmental sequence in small groups. *Psychological Bulletin, 63*(6), 384–399. https://doi.org/10.1037/h0022100

Zivi, K. D. (1997). Examining pedagogy in the service learning classroom: Reflections on integrating service learning into the curriculum. In R. M. Battistoni & W. E. Hudson (Eds.), *Experiencing Citizenship: Concepts and models for service learning in political science* (pp. 49–67). Stylus Publishing.

Zulkifli, N. F., Othman, A., Abd Rahman, H., Rahim, N. S., & Abdullah, N. K. (2019). Team-based learning: Benefits on learning and students' perception. *Education in Medicine Journal*, *11*(4). https://doi.org/10.21315/eimj2019.11.4.6

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