Beyond Student Ratings of Teachers: Continuous Improvement Cycles in a Collaborative Co-Teaching Course Using Student Feedback

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Abstract

This study documented the use of PDSA cycles in a co-taught pre-service education course in higher education. The study includes data in the form of student feedback which was collected and analyzed at the end of each semester for three years. Data were used to inform an iterative process for course refinement to improve student outcomes. Results examined the benefits and challenges of collaboration and co-teaching for both students and faculty. Implications for future research and practices are explored.

Keywords: Continuous Improvement, Assessment, Higher Education, Student Feedback

Introduction

Assessment in Higher Education

In 1992, the American Association for Higher Education (AAHE) determined that assessment in higher education should focus on the interdependence of course outcomes and the experiences that contributed to the outcomes. Given this definition of assessment, evaluating the achievement of student learning outcomes should be accomplished in conjunction with the examination of course components which ultimately lead to the attainment of content knowledge. This includes but is not limited to teaching pedagogy, student interaction, and methods of assessment.

Different types of assessment are used to evaluate student outcomes which can include formative and summative assessments (Dixson & Worrell, 2016). In formative assessments, multiple data points are collected to evaluate students' understanding of course content. This process can also be used to examine and inform program improvement. This ongoing form of assessment, or continuous improvement, is necessary for positive changes in programs (Hénard & Roseveare, 2012).

Compared to other fields, continuous improvement research in education is relatively young. Due to the promise of outcomes in fields such as healthcare and the automotive industry (Berwick, 2003; Gawande, 2007; Rother, 2009), K-12 and higher education institutions are beginning to use this practice (Bass et al., 1996; Payzant, 2005; Shupe, 1999); a practice which is sensitive in identifying student and community needs as well as changing needs (Kruse, 2001), including decision making processes at the school level (Blanton & Harmon, 2005). Program improvement in education has been met with mixed reviews (Temponi, 2005), but in fairness, is still a burgeoning field of study at the systems level. Considering the promise in other fields of study and gains noted in educational systems, continuous improvement research can and should be regularly implemented, studied, and reported on in higher education, including at the instructor and the course level.

The Plan-Do-Study-Act (PDSA) is an assessment framework that is used for continuous improvement and can be applied in education. The PDSA cycle evaluates how and whether a shift in an existing context has improved the targeted and studied practice (Langley et al., 2009). The PDSA cycle includes four unique components. For instructors, the components include (a) Plan: Instructors determine what aspects of the class will be assessed and what types of change are desired (e.g., pedagogy, course organization); (b) Do: Data in the form of feedback is collected for analysis; (c) Study: Instructors analyze the data; and (d) Act: Instructors consider the analysis and act on the information provided. 'Acting' may include revising the course or maintaining the existing course. Examples of 'acting' include shifts in lesson planning, course presentation, assignment creation, and assessment methodology.

In higher education, a PDSA cycle can occur within a course with formative (e.g., mid-semester evaluations) and summative assessment data provided by students without disrupting the course as designed (Yeager et al., 2013). Over a period of time, instructors have the opportunity to continuously and iteratively improve courses based on the collection and careful consideration of student feedback data.

Need for Context-Specific Continuous Improvement: Improving Attitudes and Beliefs about Co-Teaching and Inclusionary Practices

Pre-service education coursework and clinical experiences provide opportunities to shape the attitudes and pedagogical beliefs of developing teachers; embedded in these attitudes and beliefs can be increased attitudes about collaboration and inclusion which ultimately impacts the success of inclusion practices in their classrooms (Bacharach, Heck, & Dahlberg, 2008; Sharma, Ee, & Desai, 2003; Taylor & Ringladen, 2012). This is of particular value as students with various learning needs are increasingly taught alongside their typically developing peers in the general education setting. The 37th Annual Report to Congress on the Implementation of the Individuals with Disabilities Education Act (IDEA), states that 68.2% of students with learning disabilities spend 80% or more of their school day in a general education setting (US Department of Education, 2015). Multiple studies have found that pre-service teachers who express positive attitudes are more likely to support students with special needs and positively influence other students' attitudes towards children with special needs once they become in-service teachers (Avramidis, Bayliss, & Burden, 2000; Sharma et al., 2006; Subban & Sharma, 2005). Attitudinal training must be implemented early on in pre-service education, particularly since students' attitudes toward inclusion have been shown to decline after their first year of teaching (Costello & Boyle, 2013). Similar to students in K-12 schools, pre-service educators are influenced by their instructors and coursework (Alghazo, Dodeen, & Algaryouti, 2003). The attitudes of pre-service and practicing teachers toward students with special needs, combined with the amount of education, experience, and academic preparation they receive in teaching students with special needs, will determine the success of inclusion in the school setting once these teachers have classrooms of their own (Lancaster & Bain, 2010; Richards & Clough, 2004).

A small but growing body of literature exists documenting the perspectives of collaborating faculty in higher education and increased self-efficacy regarding the inclusion of students enrolled in these courses. Hansen and Morrow (2012) discussed the development of a co-taught course for in-service teachers and administrators on the inclusion of children with special needs in general education classrooms. Upon reflection of the course, the faculty members attributed the fluidity of the class structure and the students' respect for and across content areas to the dedication and collaborative effort they invested in the course. At the end of the course, students were more willing to explore new and different concepts and immersed themselves in the content, perhaps as a result of observing their instructors model the same behavior. Faculty modeling professional collaboration and executing meticulously co-planned and delivered lessons opened the door for students to gain knowledge about collaboration, communication, and co-teaching all the while accessing academic content. In this higher education classroom, knowledge was gained on multiple

fronts. Other higher education studies have found similar findings. For example, in a generation education course with carefully embedded special education content, students indicated that they had significantly greater confidence in meeting diverse learner's needs (Brown, Welsh, Hill & Cipko, 2008). In a more recent study, Pujanisngsih and Ambarwati (2020) also reported an increase in students' self-efficacy in the differentiation of teaching strategies in a co-taught course by a special and general education faculty.

These studies suggest that faculty in higher education have the opportunity to make a positive impact on pre-service teachers' knowledge and attitudes about collaboration, co-teaching, and inclusion by modelling these skills in collaboratively taught courses. These studies demonstrate that co-teaching in higher education can capitalize on the knowledge and expertise of faculty from different specializations and increase student learning and self-efficacy regarding inclusion and collaborative practices (Pujaningshih & Ambarwati, 2020). Despite the promise and potential of instructor driven continuous improvement review of courses using student feedback, the practice is not a standard teaching approach in higher education (Greene & Isaacs, 1998).

Current Study

Given the current shift towards more inclusive practices in the field of education, it is important that K-12 teachers gain the experience of collaboration and co-teaching in their teaching credential programs to support all children, including children with disabilities. Moreover, even though previous studies have demonstrated that co-taught courses in higher education can increase students' self-efficacy in inclusion and collaborative practices, these studies were short-term. Building on previous studies in continuous improvement, the current study aims to 1) use the PDSA model to examine the iterative process for course improvement in a post-baccalaureate, co-taught course for credential candidates in a general and special education credential program, 2) demonstrate the benefits of collaborative teaching on pre-service teachers' perception of inclusion and collaboration, and 3) discuss the continuous improvement practices implemented.

Methods

Participants

The study was conducted at a public state university located in a micropolitan community. Participants included university faculty members who co-taught an education course and pre-service teachers earning either a single subject or an education specialist credential.

University Instructors

Three dyads of university instructors participated in the study. In year one, instructors 'Casey' and 'Emile' co-taught the course. The instructors had distinct teaching backgrounds in special education and general education, respectively. Casey was a tenure track, assistant professor in the school of education with an extensive background

in autism research. Emile was a lecturer whose expertise was in the area of math teacher preparation. Neither instructor had taught this course before and chose to work together given the opportunity by the School of Education.

In year two, instructors 'Natalie' and 'Sylvia' co-taught the course. Both instructors had university teaching backgrounds in the field of special education. Natalie previously co-taught the course with another faculty member while Sylvia was teaching the course for the first time. At the time of the study, Natalie was an associate professor and Sylvia was an assistant professor. Natalie and Sylvia asked and gained administrative approval to co-teach this class.

In year three, instructors 'Ellen' and Sylvia co-taught the course. Sylvia previously co-taught the course with Natalie (year 2). Both Ellen and Sylvia had special education university teaching backgrounds. Ellen was a retired associate professor from another institution and a lecturer at the current university. She had experience co-teaching at the current university, although in a different course. Sylvia and Ellen mutually agreed to teach this course.

Teaching Candidates

In year one, 46 students were enrolled in the collaboratively taught course; 40 of the students consented to participate in the study and completed all the measures. Ten students were from the special education program, and 30 students were from the general education program earning secondary teaching credentials. Students' ethnicity included African American (2.5%), Asian (7.5%), Latino (17.5%), White (62.5%) and Other/Decline to State (10%).

In year two, 45 students were enrolled in the collaboratively taught course. Forty-four students consented to participate in the study and completed all measures. Eighteen students were from the special education program, and 26 students were from the general education program earning secondary teaching credentials. Students' ethnicity included Asian (7%), Latino (30%), White (52%), and Other/Decline to State (11%).

In year three, 45 students were enrolled in a collaboratively taught course; 42 consented to participate in the study and completed all measures. Twenty-four students were from the special education program, and 18 students were from the general education program earning secondary teaching credentials. Students' ethnicity included Asian (9%), Latino (22%), White (64%), and Other/Decline to State (5%).

Education Course

All student participants enrolled in a co-taught 15-week course in the School of Education. This course was a required course for the completion of the single subject and the education specialist teaching credential. The course focused on methods and techniques for identifying and teaching students with special needs, including culturally diverse and gifted and talented students. It also addressed collaboration between general and special

education teachers, working with diverse families, and the unique issues associated with integrating students with special needs in secondary settings.

Traditionally, this course was co-taught by instructors with special education backgrounds, although in year 1, one of the faculty's expertise is in the area of general education teacher preparation. Students who are enrolled in the course are from different disciplines, general education and special education, and they met with both instructors weekly.

Students were divided into small groups for class activities and a final group project. In year one, for activities and the final group project, single-subject group members were heterogeneous in their content area specialization. In years 2 and 3, single-subject group members were homogeneous in their content area specializations. For example, all single-subject students in the same group would have the same specialization background, such as science. Education specialists were placed into all groups as determined by the instructors.

Measures

Student Surveys

Institutional Review Board approval was granted for this study from the institution of the first author each of the three years discussed. All participants were given consent forms which were read aloud by an independent party; these were collected and reviewed prior to distribution of the survey.

The post-course survey included four open-ended questions that assessed topics related to collaboration and co-teaching. Questions included: 1) What did you enjoy about taking a co-taught class? 2) What did you not like about taking a co-taught class? 3) What appeared to be the role of Professor 1 and Professor 2? and 4) Do you have anything else you want to say about your co-taught class? Any advice for the future?

PDSA

To capitalize on the benefits of PDSA in the iterative revision process, instructors incorporated the four components of the PDSA cycle. Student Learning Outcomes (SLO) were a constant, therefore instructors were not able to change the content of the course. Other factors, including unit load and timing of the course were predetermined by administration and were also outside the instructor's control. Within instructor control were aspects of the course such as student grouping for assignments and content delivery methods. For this reason, these two features of the course were emphasized for course planning and assessment. Data was collected using post-course survey and analyzed for consideration in the following iteration.

Results

An *iterative process,* using the PDSA framework, was used to inform changes and improvements for the course. Each year, the PDSA cycle was used to determine the strengths of the course and areas that can be improved for the subsequent year. Data were collected for three consecutive years and analyzed to inform changes in the course delivery method, student groupings for assignments, and physical space for co-teaching With each iteration, data also demonstrated more positive student experience in each of the three domains. Instructors determine what aspects of the class will be assessed and what types of change are desired (e.g., pedagogy, course organization); Do: Data in the form of feedback is collected for analysis; Study: Instructors analyze the data; Act: Instructors consider the analysis and act on the information provided.

Course Delivery

The same education course was taught across years one through three. University instructors were given the flexibility in the method of collaboration to teach the course, and each year, the faculty's method of collaboration changed based on feedback from previous student evaluations. It should be noted that courses in the School of Education include consistent SLOs and signature assignments. This consistency ensures that no matter the instructor(s), students will have a similar academic experience. Over the years, this course, like others, has had shifts in instructors, but the content and assignments remain the same and true to the established SLOs (Table 1).

In year one, the instructors created a single course including students from the single subject and education specialist credential programs. The course was originally designed as a hybrid course; part online and part in-person instruction. During the initial weeks of instruction, the instructors co-taught the course. Ongoing student feedback indicated that students preferred in-person instruction. As a result, midway through the term, the instructors removed the hybrid component and taught the remaining sessions by splitting the class into two heterogeneous groups (mixed of single-subject and education specialists credential pre-service teachers in each group) with one instructor teaching each group for one session and then switching groups the following week. This method of collaboration continued through the end of the term except for when guest speakers were present; during those times, the two instructors and all students met as one whole group.

During this first year, students reported the need for better alignment of instructor communication and the capitalization of differing instructor teaching styles. For example, one student noted, 'The two professors did not seem to be on the same page. I felt as though we got different answers depending on who we asked.' These challenges were identified by the instructors as an area for improvement in subsequent years.

Table 1

Iterative Process for Continuous Improvement, Course Delivery

	PDSA Cycle 1	PDSA Cycle 2	PDSA Cycle 3
	Year 1 Suggested Changes	**Year 2 Suggested Changes**	**Year 3 Suggested Changes**
Course Delivery	**Plan:** Co-constructed lectures and defined roles and responsibilities within each lecture period. **Do:** Lectures were delivered as planned. **Study:** Post-course survey responses were analyzed. **Act:** Changed from one large lecture (instructors alternated weeks in lecture) to smaller lectures (e.g., four 1-hour lectures).	**Plan:** Weekly lecture topics were determined by instructor strength and research interest. **Do:** Instructors delivered lectures as planned. **Study:** Post-course survey responses were analyzed. **Act:** Students liked the four 1-hour lectures and would like the structure to be continued. • *Block 1*: Large lecture • *Block 2*: Split into two small groups with each faculty leading one group • *Block 3:* Two small groups swap professors • *Block 4:* Regroup together	**Plan:** Previous feedback suggested that Year 2 format was effective; the lecture format from Year 2 was planned for Year 3. **Do:** Instructors delivered lectures as planned. **Study:** Post-course survey responses were analyzed. **Act:** Students would like the professors to co-teach all four blocks. Future sections will plan for co-teaching of the four blocks.

In years two and three, the instructors were given two classrooms for the semester and used the space to demonstrate various collaborative teaching models in the following way: For each 4-hour class session, the instructors created four 1-hour blocks. In Block 1, the students and the instructors met as a group in one classroom. An overview of the class was provided followed by a co-taught lecture and/or collaborative activity. In Blocks 2 and 3, the instructors parallel taught by each taking half of the students for the first hour. In the second hour, the instructors swapped the groups of students and repeated the same lecture and activity for the second group. Block 4 was reserved for either guest speakers or time for students to work collaboratively in an assigned group on their final project. Data from year 3 indicated that students were satisfied with the groupings and the exposure to the different collaborative teaching methodologies. Students reported that they particularly enjoyed and benefited from the co-taught portions of the class and would prefer all four blocks to be co-taught.

In these two years, the instructors also planned to be more cohesive in their communication with the students. The instructors' plan for better communication was successful; students did not note any discrepancy in communication between the two instructors. Instead, participants appreciated and highlighted the 'multiple perspectives of the course, which indicated a more collaborative communication style between the instructors. By observing the instructors co-teach, students recognized the challenge and work involved to maintain a balance of roles in shared responsibility. They also gained valuable insight from having two perspectives on a given topic. For example, one student commented that 'two perspectives on topics was interesting as well as the presentation of different personal experiences. Each brought something different to the table.' Most importantly, students understood that professional collaboration will be an expectation in the workplace once they graduate and valued the opportunity to observe two instructors model collaboration during their pre-service coursework. The positive comments expressed by the students were viewed as a great success for the co-teaching partnership between the instructors.

Student Group Assignment

Signature assignment groups in year one were heterogeneous in terms of content area specialties of students (Table 2). At the end of year one, student feedback data indicated that students would have preferred working in homogeneous groups on a lesson plan in their specialized content area. Students also indicated that the groups were contentious due to the varied expertise of the group members. Members had various areas of expertise yet the lesson plan they were all working on was specific in one content area that may be outside of some of their expertise. In year two, the instructors incorporated this feedback and created homogeneous groupings based on content area specialization for single subject candidates. For education specialists, same as year 1, these pre-service teachers were randomly assigned to groups.

While groups were homogeneous in content area specialization (i.e., single subject), student feedback data from year two indicated that the education specialists' strengths were underutilized due to their different academic focus areas. In year three, the instructors surveyed the education specialists on the first day of the course asking for their content preferences. Group assignments were announced during the second class meeting. The groups were homogeneous in content area specializations and education specialists were matched based on their content preferences. This method of grouping accounted for all the students' strengths and preferences. All the groups were composed of students who indicated a content preference in each area.

It is important to note that year three data demonstrated a shift in student response from the previous two years; multiple participants from year three indicated that the course provided the impetus for a shift in comfort regarding co-teaching and professional collaboration, as well as an understanding of how co-teaching can benefit all students (i.e. inclusion). One participant summed it up well by responding, 'Collaboration between sped and gen ed is key to student success.' Altering the way groups were formed for the

culminating project by carefully considering student feedback may be the main contributor to this positive attitudinal shift.

Table 2

Iterative Process for Continuous Improvement, Student Group Assignment

	PDSA Cycle 1	PDSA Cycle 2	PDSA Cycle 3
	Year 1 Suggested Changes	Year 2 Suggested Changes	Year 3 Suggested Changes
Student Assignment Groups	**Plan**: Co-constructed assignments and assessments. **Do:** Assignments and assessments were delivered as planned and collaboratively graded. **Study:** Post-course survey responses were analyzed. **Act:** Changed from heterogenous groups to homogenous group based on content specialties for general education candidates; education specialists are randomly assigned to groups.	**Plan:** Groups for assignments were created using content specialties for general education candidates; education specialists were divided and assigned to groups. **Do:** Assignments and assessments were delivered as planned and collaboratively graded. **Study:** Post-course survey responses were analyzed. **Act:** Continue with homogenous groups for general education but assign education specialist based on their content preferences.	**Plan:** Groups for assignments were created using content specialties for general education candidates; education specialists were surveyed and assigned based on their content preference. **Do:** Assignments and assessments were delivered as planned and collaboratively graded. **Study:** Post-course survey responses were analyzed. **Act:** Analysis revealed satisfaction with grouping for assignments. Future sections will continue the practice of content-based grouping of students.

Physical Space for Co-Teaching

Instruction in year one was originally provided by both instructors in one classroom with all the students (Table 3). Survey data and mid-course evaluations indicated that smaller groups would increase time for more individualized attention and minimize competitive and differing responses from the two instructors. In year two, the instructors reserved two classrooms prior to the start of the term that were located near one another. The class was organized in four 1-hour blocks; the first and the last block included all the students, and the instructors dedicated class time to course overview and announcements (Block 1) and

guest speakers (Block 4). The second and third blocks focused on instruction by the two instructors who swapped groups between the blocks, delivering the same lecture twice.

In year three, the instructors also implemented a four, 1-hour block schedule similar to year two. Data from year two students indicated that the room reserved for whole group instruction was too small and hindered their learning experience. Data also indicated that although the rooms were located in the same building, they were too far apart and too much time was lost transitioning between classrooms. In year three, instructors were able to reserve a larger lecture room which easily accommodated the whole group. In addition, a smaller adjacent breakout room was reserved to provide for smoother transitions. However, there were still some challenges that the instructors were unable to address. These were administrative barriers outside of the instructors' control, such as the location of the classroom, time the course is offered (e.g., late evening), and the units of the course.

Table 3

Iterative Process for Continuous Improvement, Physical Space for Co-Teaching

	PDSA Cycle 1	**PDSA Cycle 2**	**PDSA Cycle 3**
	Year 1 **Suggested Changes**	**Year 2** **Suggested Changes**	**Year 3** **Suggested Changes**
Classroom Physical Space	**Plan:** In collaboration with administration, classroom assignments were determined. **Do:** The course was held in the assigned classrooms. **Study:** Post-course survey responses were analyzed. **Act:** Rooms reserved for the course were configured poorly for larger group settings; new rooms were assigned for the following year to address this feedback.	**Plan:** In collaboration with administration two rooms were reserved; a larger classroom was reserved for whole group instruction alongside a smaller breakout room located nearby. **Do:** The course was held in the assigned classrooms. **Study:** Post-course survey responses were analyzed. **Act:** Room reserved for small group was too small; a bigger room was suggested for whole group instruction. The rooms were too far from one another for the transition between blocks.	**Plan:** In collaboration with administration the large room from the previous iteration was reserved alongside multiple, smaller breakout spaces. **Do:** The course was held in the assigned classrooms and breakout spaces. **Study:** Post-course survey responses were analyzed. **Act:** Analysis revealed satisfaction with the classroom and breakout space arrangement. Future sections will continue the practice for space allotment.

Discussion

Using repeated PDSA cycles, the instructors were able to reflect and improve their course over the three years. Each year, at the end of the term, instructors identified and modified aspects of the course to improve student outcomes, including students' perception of collaborative co-teaching and inclusion. This process highlighted the importance of assessment in the form of student feedback for continuous course improvement. Additionally, the results also showed that collaborative co-teaching in higher education is a promising teaching model to teach content across disciplines and to promote collaboration skills in pre-service teachers.

In years 2 and 3, course improvement was driven by student feedback from the previous year. Domains that were within the instructors' control, such as course content delivery, teaching methods, and grouping of students were evaluated and improved. For example, in year 3, the instructors made changes to how students were grouped, and they also requested classrooms that were closer to one another to shorten the transition time between their blocks. However, there are institutional barriers that are beyond the instructors' control. These challenges are similar difficulties that are common in K-12 schools, which, most notably include the lack of, or minimal, administrative support.

Across the courses, participants expressed frustration with class size, course schedule, number of hours assigned to each course session, and inadequate classroom space. Additionally, even though the course is a program requirement for both credential programs (single subject and education specialist), the sequence of courses for each of the credential programs was different. This impacted when students enrolled in this specific course. Students from both programs expressed concern for unequal knowledge bases to be able to work independently and contribute fairly in groups given the same lectures and activities. Administratively, an examination of requisite knowledge needed for successful participation and completion of the course would help avoid the imbalance of knowledge among students. A solution might be to hold the course later in the academic program to ensure requisite experience with student teaching and course completion for all students. Similar to primary and secondary schools, an effective collaborative program will require administrative support to succeed (Nierengarten, 2013; Santoli, Sachs & Romey, 2008). The iterative process of course improvement provided the instructors with insight into the administrative challenges. While the instructors were unable to independently make changes regarding space and course schedule, ongoing communication with administration facilitated remediation for the noted challenges.

A limitation of the study is that the co-teaching dyads were inconsistent across the years. Instructors from the year 1 dyad did not teach the course again, however, one instructor taught the course in both years 2 and 3. Though the dyads did vary, the SLOs and signature assignments for the courses remained the same. Additionally, the instructors considered feedback provided by students taught by the previous co-teaching dyad. Course improvements were made based on student feedback, including class size, classroom availability and flexibility, and number of units; all critiques which are not specific to the instructor at a given time.

Implications for Research and Practice

In an era of shifting laws and educational needs of a diverse student population, an urgency exists to examine current practices in pre-service teaching programs. IDEA (2004) mandates that all eligible students with disabilities are ensured with special education and related services. It also states that to the maximum extent possible, these students should be educated with their typically developing peers. For many children with disabilities, this means that they are included in general education classrooms. The current study emphasizes a critical skill set that all teachers, both general education and special education, need to best serve the students in the field. Examination of data collected during PDSA cycles can and should be used to inform pre-service course design and pedagogical changes required to train future teachers, taking into consideration the continual shifts in the landscape of K-12 education. Results from each iteration should be shared and discussed amongst colleagues within the School of Education with an understanding that findings may have implications for student learning experience, such as groupings for collaborative assignments and efficient classroom spaces. Implications for best practices should also be carefully considered for courses; while collaboratively taught courses have specific needs and considerations, findings may be applicable to traditional, single instructor courses.

Systematic implementation and evaluation of PDSA cycles in collaboratively taught courses can provide valuable information about the course and program improvement needs and possibilities. Current research suggests great promise for collaborative teaching models in pre-service programs, yet the practice is under-utilized despite the co-teaching and collaborative demands of K-12 teachers. Lack of systematic and consistent co-teaching and collaborative teaching pedagogy in pre-service programs has resulted in certificated teachers feeling underprepared to co-teach and collaborate in their own classrooms (Chitiyo & Brinda, 2018).

Regardless of department, institutions of higher education should continue to offer co-taught and cross-registered courses. However, this practice is largely uncharted or documented in the literature, thus, more research is warranted. Programs should consider implementing and documenting PDSA cycles as a method of improving pedagogy and student outcomes. Implications of the practice reach beyond education as many fields of study would benefit from an interdisciplinary collaborative teaching model as a model for future professional expectations.

Conclusion

Collaborative co-teaching is a powerful teaching method that capitalizes on the expertise of two instructors, but it is not without challenges. While we cannot eliminate all barriers of collaborative co-teaching in higher education, it is possible to evaluate and make iterative changes that are within the instructors' control. Findings from this study show that when instructors implement PDSA cycles and iteratively adapt to student needs, significant course improvements that impact student outcomes are possible. The results of this study

should be interpreted with caution. The data was collected from one course over three years from one institution. While this study was conducted in a preservice education program, the collaboration model and iterative evaluation process can generalize across disciplines.

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