Abstract

In the United States, an increasing number of teacher education programs are using coteaching as a model for student teaching. Coteaching occurs when teacher candidates work collaboratively with their clinical educator(s) to share responsibility for students' learning, develop teaching practices and skills, and coevaluate instruction. Currently, there are no psychometrically validated instruments that assess teacher candidates' and clinical educators' coteaching experiences. This study documents the development and validation of a coteaching instrument that used thematic content analysis and Confirmatory Factor Analysis (CFA) to identify eight subscales. The subscales are *Equality in the Classroom*, *Learning Opportunities for Students*, *Connecting Theory to Practice*, *Coteacher Collaboration*, *Professional Development*, *Personal Pedagogical Skill Development*, *Types of Teaching*, and *General Coteaching Practices*. The results of this study demonstrate that the coteaching survey is a valid and reliable instrument to measure perspectives and experiences of coteaching across a variety of research settings.

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Evaluating Coteaching as a Model for Pre-Service Teacher Preparation: Developing an Instrument Utilizing Mixed Methods

*T*eacher education programs incorporate a variety of field experiences to expose pre-service teachers to the nuances and challenges of teaching. Field experiences are a mainstay in teacher education programs and re-emphasize the importance and value of student teaching as the "practice turn" (Cochran-Smith et al., 2016). Traditional models of student teaching have three common characteristics to support teacher candidates'[1] learning: (1) observation of clinical educator; (2) feedback from clinical educators and university field instructors; and (3) teacher candidates' reflection on practice. However, research suggests that a lack of collaboration limits teacher candidates' opportunities for reflection on learning and can often result in the mimicking of teaching practices without developing an understanding of the pedagogical reasonings underpinning teacher decision-making (Drewes et al., 2021; Soslau, 2012; Soslau et al., 2018).

Increasingly, teacher education programs are implementing a coteaching model for student teaching (Bacharach et al., 2010; Drouin et al., 2020; Strobaugh & Everson, 2019). Coteaching occurs when teacher candidates work collaboratively with their clinical educator to coplan, coteach, and coevaluate their instruction. These actions are employed to reduce the theory to practice gap, share responsibility for students' learning (Soslau et al., 2018), and develop teaching practices and skills (Gallo-Fox & Scantlebury, 2016; Murphy & Martin, 2015).

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[1] Teacher candidate refers to students enrolled in teacher education programs and clinical educators are teachers who host teacher candidates during field experiences.

There are currently no psychometrically rigorous, validated survey instruments to collect and report on teacher candidates' and clinical educators' perceptions of their coteaching classroom experiences.

Several qualitative studies have documented the positive outcomes of the coteaching model for all stakeholders–students, teacher candidates, and clinical educators alike. Meaningful learning outcomes for students include improved student achievement (Bacharach et al., 2010) and attitudes (Murphy et al., 2004). Coteaching models also provide professional development for clinical educators (Milne et al., 2011; Gallo-Fox & Scantlebury, 2016) and have been shown to encourage a willingness in beginning teachers to seek collaborative professional relationships (Murphy & Scantlebury, 2010).

The increasing number of teacher education preparation programs using coteaching as a model for student teaching has expanded the quantitative options for studying this model (Drouin et al., 2020; Guise et al., 2017; Strobaugh & Everson, 2019). There is also a need for reliable and valid instruments to gather information from various stakeholders within the coteaching relationship (Drewes et al., 2020). Yet, there are currently no psychometrically rigorous, validated survey instruments to collect and report on teacher candidates' and clinical educators' perceptions of their coteaching classroom experiences. This poses a problem as accreditation for teacher education programs from U.S.-based organizations, such as the Council for the Accrediation of Educator Preparation (CAEP), require the use of statistically reliable and valid instruments to assess teacher candidate preparation and performance (CAEP, 2013). Beyond a rationale related to the ubiquitous need for teacher preparation programs to attend to accreditation requirements, the ability to assess the usefulness of coteaching is of critical importance to any program improvement efforts. As teacher preparation programs across the United States take up the Blue Ribbon Panel report's recommendation to implement coteaching models (NCATE, 2010), teacher education researchers are apt to require assessment tools to evaluate program improvement efforts and study the quality of coteaching initiatives. The aim of our work was to address this critical need. More specifically, this study's goal was to develop a reliable and valid instrument to help teacher education program administrators, education researchers, and other stakeholders ascertain teacher candidates' (student teachers) and clinical educators' (mentor teachers) perceptions of the implementation, effectiveness, and use of coteaching.

Research Context

The research participants for this study were enrolled in one of three teacher preparation programs across two colleges within the same university located on the mid-Atlantic coast of the United States. The programs included teacher candidates studying to earn certifications in early childhood, elementary teacher education, special education, middle grades content areas, and secondary science. Candidates all sought a four-year undergraduate degree, completed full time student teaching for at least one semester (15 weeks), were aged 18-21, and the majority were female. Coteaching was used as the model for student teaching across all three programs and the researchers and teacher educators were interested in learning more about the experiences of coteachers. All three programs were also in need of a valid and reliable instrument to collect data for accreditation approval as evidence of continuous program improvement efforts. Though the study took place in the United States, the work is applicable in an international context as coteaching is gaining popularity across the globe as a viable approach for clinical practice.

Coteaching as a model for student teaching allows for teacher candidates and clinical educators to share responsibility for all aspects of student (pupil) learning including instructional planning, teaching, assessment, and evaluation (Martin, 2009). Both teacher candidates and experienced teachers share expertise in content and pedagogy as they coplan, coteach, and coevaluate student learning and their professional practice (Soslau et al., 2018). Coteaching experiences also offer a number of avenues for teacher candidates and clinical educators to improve the classroom learning environment through the equality of teacher voices, increased learning opportunities for students, occasions for teacher collaborations, connecting educational theory to practice, varied avenues for professional development, and opportunities to employ a diverse array of instructional approaches. These outcomes framed the survey development. The following section expands upon each of these outcomes as the foci of the eight scales developed in this survey.

Equality of Voices in the Classroom is evident when coteachers share ideas, demonstrate mutual respect, view each other as colleagues, take coresponsibility for student learning, and share authority in the classroom. The four items on this scale were drawn from the literature supporting teacher learning during student teaching, particularly during conditions when clinical educators and teacher candidates work together in the same classroom. Clinical educators have more power in the student teaching practicum site (Anderson, 2007) and teacher candidates generally assume additional responsibility only during later stages of the practicum (Hoy & Woolfolk, 1990). However, research has shown that more equal power distribution increased teachers' opportunities for learning (Nguyen, 2009; Smith, 2007; Zeichner, 1992). Coteaching is a reduced hierarchical model of student teaching, emphasizing the sharing of power and responsibility along with respecting and valuing all teachers' voices (Drewes et al., 2021; Scantlebury et al., 2008). Because candidates are expected to assume power and responsibility immediately, and clinical educators share control of all classroom aspects related to planning, instruction, management, and assessment from the first day of student teaching, this scale examines participants' perceptions on sharing power and input on teaching decisions and practices.

Student Learning Opportunities items are built upon studies that examined benefits to students in classrooms with two teachers, including a teacher candidate and clinical educator or two classroom teachers such as in a special education setting, or in a classroom with a high population of English language learners. Though some lament the lack of empirical data related to student outcomes and perspectives (Drewes et al., 2020; Friend et al., 2010), researchers of the coteaching model have begun to show that coteaching leads to increased learning opportunities for students (Bacharach et al., 2010; Badiali & Titus, 2010; Dove & Honigsfeld, 2010), more effective student learning (Rice & Zigmond, 2000), increases in students' positive attitudes toward science (Murphy & Beggs, 2010), increased access to help for students (Magiera et al., 2005), and increase of students' exposure to a variety of instructional approaches (Kamens, 2007).

Connecting Theory to Practice and *Coteacher Collaboration* are the next two scales and are interconnected because teachers' learning opportunities are the result of strong teacher-to-teacher collaboration. There are several benefits of clinical educators and teacher candidates working together closely throughout the practicum experience. Since the coteaching model requires coteachers to engage in discussions of practice and to develop justifications for their instructional decisions about a shared teaching experience, candidates and clinical educators have opportunities to make theory to practice connections in the conversations (Soslau et al., 2018).

Research has shown that when justifications and rationales are shared between clinical educators and teacher candidates, not only are these connections possible, but developing a shared understanding of the characteristics of effective teaching is more likely (Soslau, 2012; Zeichner, 2010). Research around collaboration between teacher candidates and clinical educators shows that a strong relationship via mutual respect is critical to enabling coteachers to collaborate and to resolve instructional problems such as issues related to classroom management, student motivation, and interactions with parents (Austin, 2001; Parsons & Stephenson, 2005; Phelan et al., 1996).

Professional Development and *Personal Pedagogical Skill Development*, the next two scales, focused on whether teachers were aware of and receptive to these opportunities for personal growth and if they viewed planning and teaching episodes as sites for their own professional development. Proponents of coteaching often cite the coteaching experience as a form of professional development for clinical educators (Bacharach et al., 2010; Gallo-Fox & Scantlebury, 2016). The idea that clinical educators improve their own professional practice when hosting a candidate is not new (Koskela & Ganser, 1999; Landt, 2004); however, coteaching deliberately places both teachers in the role of learner. Shifting the roles of the clinical educator from mentor to colearner of teaching provides opportunities for growth (Gallo-Fox & Scantlebury, 2016).

Personal Pedagogical Skill Development scale included small grain size skills such as learning formative assessment techniques or building understandings of how to integrate

Coteaching experiences also offer a number of avenues for teacher candidates and clinical educators to improve the classroom learning environment through the equality of teacher voices, increased learning opportunities for students, occasions for teacher collaborations, connecting educational theory to practice, varied avenues for professional development, and opportunities to employ a diverse array of instructional approaches.

literacy in the classroom. Similarly, we were interested to learn if participants perceived the experience as good preparation for candidates' future practice as independent practitioners. Opponents of coteaching may claim that candidates do not have enough opportunities for independent practice. Yet, many coteaching approaches provide for lead roles which likely reflect similar independent practice conditions in more traditional student teaching models (Gallo-Fox et al., 2006).

Types of Teaching and General Coteaching Practices are the final two scales on the survey and they focused on the approaches used during the student teaching experience, such as whether or not teacher candidates completed independent practice, led instruction, engaged in "stepping up" and "stepping back" (Tobin & Roth, 2006) during coinstruction, and took active roles across coplanning, coteaching, and coevaluation. These oft-cited components of coteaching are hallmarks of successful partnerships (Bacharach et al., 2010; Scantlebury et al., 2008; Soslau et al., 2018). By examining the frequency of specific types of teaching practice (Types of Teaching) and the prevalence of coteaching activities beyond instruction (General Coteaching Practices), researchers may be able to better describe coteaching contexts, their efficacy, and areas for improvement.

Method

Participants

Survey respondents were clinical educators and teacher candidates who recently participated in a coteaching student teaching placement. The clinical educators represented teachers from all grade levels from infants to high school and the teacher candidates accordingly were placed in a diverse collection of school settings from early childhood through secondary levels. In the initial pilot, 147 responses were collected and for the testing of the revised survey instrument, 590 responses were collected over the following four semesters. Further details on the background information on these survey respondents will be presented in the results section.

Data Collection

The research team, comprised of university personnel, clinical educators, and teacher candidates, sought to develop, to empirically validate, and to implement a widely applicable survey to measure clinical educator and teacher candidate beliefs regarding their experiences with coteaching.

This study was completed within a larger on-going research study on the impact of coteaching on teacher candidates, clinical educators, and their students. These pilot and development phases were encompassed under established Institutional Review Board protocols. Participants were recruited to complete this survey via email at the completion of a coteaching placement. Completion of the survey was optional and therefore this sample may suffer from volunteer bias. Additionally, no extra credit nor compensation was offered due to the anonymous nature of the online survey format.

Measure Development Process

Our initial research interests were to explore what avenues were available for clinical educators and teacher candidates to provide feedback on the overall coteaching program and also to share their experiences and the relevant impacts on their teaching that resulted from the coteaching model. Supported by a collection of research literature and anecdotally from years, actually decades, of experience with this coteaching model on a small scale, the research team knew that clinical educators often reported benefits like integration of new pedagogies, innovation in instructional techniques and management, improved self-efficacy toward their own teaching practice, and increases in student learning outcomes. Our research team had numerous discussions early in the process regarding the best way to explore these two-way interactions between clinical educators and teacher candidates: how the clinical educator impacted the teacher candidate's professional expertise and also how candidate's presence influenced the clinical educator's pedagogical practice as well. We sought a research approach that would best reflect the dialogic nature of the coteaching model for teacher preparation.

From this research impetus, the research team, comprised of university personnel, clinical educators, and teacher candidates, sought to develop, to empirically validate, and to implement a widely applicable survey to measure clinical educator and teacher candidate

beliefs regarding their experiences with coteaching. The goal of this type of survey was to provide feedback from both perspectives which would be used to modify the overall coteaching model for teacher preparation at the university. Additionally, the survey offered teacher candidate and clinical educator respondents an opportunity to reflect on their own development as a teacher and also as a teacher educator for clinical educator respondents. In sum, the driving force behind the development and validation of this survey is that our research team wanted to develop a better conceptual understanding of what coteaching looks like from the perspectives of the participants.

The survey development process was influenced by the meta-framework presented by Onwuegbuzie et al. (2010) for a mixed methods development process and the four-step procedure established for developing and validating measures (Crocker & Algina, 1986; Sax, 1997). These frameworks guided our approach to the creation of possible survey items, testing, and refinement of these items, all while utilizing cyclic qualitative and quantitative approaches to develop a measure that would allow the clinical educators and teacher candidates to reflect on the coteaching experience as part of the path to their own professional development. While taking this approach, our research team sought to describe accurately this experiential learning setting for clinical educators and teacher candidates and in doing so, we worked to develop this survey to operationalize the practices and outcomes that we could expect these stakeholders to experience across a variety of coteaching settings.

In the first cycle of item development, our research team qualitatively reviewed existing surveys related to student teaching already in use by our home institution and other similarly purposed surveys from other institutions. In the next phase of literature review [Step 1 in Table 1], the lead author collected and reviewed numerous coteaching related articles through a literature review to create an initial list of 88 survey items for clinical educators and 73 items for teacher candidates. This initial collection was then also qualitatively reviewed by the research team for face validity and content validity based on their collective expertise in this research field [Step 2 in Table 1]. All survey items were structured as Likert-type responses with 5-point scale with a not applicable or unclear option. Additionally, after each grouping of eight to ten items, there were open response spaces included in the online survey with a prompt to encourage coteachers to indicate unclear items or provide additional comment if desired. Coteachers rarely used open response spaces; but when used, the comments provided useful insight to specific circumstances within the coteaching placement. These items were written to encompass the prevalent themes of the body of coteaching related research described previously. With full realization of the negative impact on responses from such a long survey (Galesic & Bosnjak, 2009; Schwarz et al., 1998), we undertook the next round of analytic review to pare down these items to devise an effective and practical survey instrument.

Overview of Analytic Approach

Factor analysis is a category of statistical techniques that examine patterns of variance and correlation (covariance) within participant responses on a survey instrument. Exploratory factor analysis (EFA) starts with all items and works to uncover related latent variables and to group these items into subsets based on participants' patterns of responses. The main goal of EFA is to identify these sets of items and does not base the organization of survey items to relevant theory. Confirmatory factor analysis (CFA) emphasizes the testing of hypothetical groupings of items based on an appropriate theoretical framework to determine how well patterns of responses fit with the proposed model. Since prior research in coteaching as a teacher preparation model was used to develop an a *priori* framework to classify survey items in the pilot phase, CFA is most appropriate to employ for these theory testing survey development efforts (Stevens, 1996). As such, this study focuses on the survey development process using both qualitative thematic analysis and quantitative CFA methods over two phases: Phase 1 Pilot Instrument Analysis and Phase 2 CFA. See Table 1 for an overview of the development and analytic steps.

This study focuses on the survey development process using both qualitative thematic analysis and quantitative CFA methods over two phases: Phase 1 Pilot Instrument Analysis and Phase 2 CFA.

Table 1
Overview of Development and Analysis Procedures

Initial Survey Development Phase	**Step 1:** Qualitatively focused item writing based on themes present in literature review of coteaching studies
	Step 2: Qualitatively focused item review by expert panel and research team for face and content validity
Analysis Phase 1: Pilot Instrument Analysis	**Step 3:** Pilot data collected from one semester of coteaching placements
	Step 4: Quantitively driven item analysis of pilot data
	Step 5: Qualitatively focused content analysis of items by research experts
	Step 6: Qualitatively focused and consensus driven thematic analysis by research team to create subscales
Analysis Phase 2: Factor Analysis of Revised Survey Instrument	**Step 7:** Data collected from four additional semesters of coteaching placements
	Step 8: Quantitative item analysis of full data set
	Step 9: Quantitatively driven CFA to investigate and confirm construct validity
	Step 10: Qualitatively focused final review by research team to confirm content validity

Overview of Analytic Approach in Phase 1. As the pilot sample from the first round of data collection was too small for traditional EFA approaches (MacCullum et al., 1999), we conducted an item analysis of this pilot data [Step 4 in Table 1]. We examined the correlation matrix for items to remove that had numerous very low (<.4) or many very high correlations (>.8) with other items (Field, 2013). Additionally, we reviewed the item-total correlations and identified items for removal that were also very low (<.4) (Field, 2013). Next, utilizing the open response feedback and the research team's professional expertise in coteaching, the remaining items were reviewed to ensure there were no further items that were redundant or unclear in meaning to the survey respondents [Step 5 in Table 1]. These extraneous items were removed. Lastly, the research team, along with additional experienced clinical educators and teacher candidates, evaluated the remaining items qualitatively with a thematic analysis of the content of each item. Through a consensus driven approach, items were categorized to create hypothesized subscales [Step 6 in Table 1]. Cronbach's alpha was calculated for the hypothesized subscales to determine the initial reliability. A final draft of the survey was then employed in the second phase of this development and validation project.

Overview of Analytic Approach in Phase 2. After the preliminary mixed methods analysis of the pilot survey, the revised draft of the survey was used for data collection [Step 7 in Table 1]. There is no one rule for acceptable or minimum sample sizes to conduct a confirmatory factor analysis (MacCullum et al., 1999). The acquired sample size met the wide array of diverse guidelines for sample sizes for CFA, including the absolute sample size (DiStefano & Hess, 2005), ratio of sample size and number of items (N/p; Benson & Nasser, 1998), ratio of number of items to factor (p/f; Marsh et al., 1998), evaluation of factor loading values (Wolf et al., 2016), calculations of maximal reliability and construct validity (and H; Gagne & Hancock, 2006). The sample size for the current CFA met all of the aforementioned guidelines and was deemed appropriate.

The first step of the next round of analysis was to examine again the correlation matrix [Step 8 in Table 1] for the items with too low or too high correlations (Field, 2013). Next, the statistical software package AMOS was used to represent the model graphically with each of the six hypothesized latent variables being illustrated in a 6-factor model [Step 9 in Table 1]. This CFA presents a Chi squared statistic for determining model fit. However, numerous researchers have determined that solely judging a CFA model by the Chi squared statistic is problematic (Brown, 2006; Hu & Bentler, 1999). Instead, we reviewed several fit statistics to determine how well the factor model explains the observed data.

Bentler (1994) and Thompson (2004) identified a problem with only interpreting one model fit index and instead support the evaluation of multiple indices to gain a more in-depth understanding of the overall model fit. Other model fit indices were also examined as there are established problems with interpreting the χ^2 statistic (Dickey, 1996; Schumacker & Lomax, 1996; Stevens, 1996) as it can be strongly influenced by sample size. The Normative Fit Index (NFI) and Comparative Fit Index (CFI) are less likely to be influenced by sample size (Hu & Bentler, 1999). Root mean square error of approximation, or RMSEA, is another recommended index to indicate good model fit (Arbuckle, 2005; Fan et al., 1999). These fit indices guidelines are summarized in Table 2. Lastly, to determine the internal reliability of each of the examined subscales from the CFA model, the mean, standard deviation, and Cronbach's alpha for each subscale were calculated.

Table 2
Fit Indices Guidelines for Confirmatory Factor Analysis

Fit Index	Guidelines
χ^2 p value	> .05
CMIN/DF	< 5.0
NFI	> .90
CFI	> .90
RMSEA	< .10
SRMR	< .08
AGFI	> .90
PCFI	> .50

Table 3
Certifications Held or Pursued for All Survey Respondents

Certification Pursued or Held by Coteacher	Percent of Pilot Sample (Phase 1)	Percent of Validation Sample (Phase 2)
Early Childhood	19.7%	19.7%
Elementary School	86.4%	81.7%
Middle Grades	27.9%	44.2%
Secondary Grades	2.7%	7.8%
Sample Size	147	590

Results

Pilot Data Analysis

Analysis Phase 1. We conducted the initial pilot study of the survey with teacher candidates and clinical educators participating in coteaching experiences in the Fall, 2014 semester [Step 3 in Table 1]. We collected electronic surveys from 60 teacher candidates and

87 clinical educators. The teaching certifications held by clinical educators or being pursued by teacher candidates were largely elementary grade levels, which is reflective of the teacher preparation program at the university research site. The percentages of each certification type are presented in Table 3. Clinical educators may hold and teacher candidates may pursue more than one certification so the percentages do not total 100%. Additionally, all the clinical educators reported holding a graduate degree and had between one and over 21 years of experience teaching. Further demographic data, such as years teaching for clinical educators and teacher candidates' program affiliations, is presented in Tables 4 and 5.

This phase 1 pilot data was first analyzed via item analysis of the means, standard deviations, and item correlations of the 73 parallel items for clinical educators and teacher candidates and the 15 additional items only presented to clinical educators. This first quantitative review [Step 4 in Table 1] identified 30 items that met the guidelines established for removal as described in the methods section (e.g., very low item-total correlation, <.4). Next, the research team reviewed the open response sections for items that the survey respondents indicated were unclear. The research team worked to edit these items to improve the clarity and readability or decided to remove the item due to redundancy. From this qualitative content review [Step 5 in Table 1], we deleted 19 additional items and rewrote four other items.

Table 4
Years of Teaching Experience in Clinical Educator Survey Respondents

Years of Teaching Experience	Percent of Pilot Sample (Phase 1)	Percent of Validation Sample (Phase 2)
1-5 years	5.4%	5.9%
6-10 years	19.0%	16.6%
11-15 years	9.5%	11.5%
16-20 years	15.6%	8.1%
21 years or more	9.5%	9.5%
Sample Size	87	306

Table 5
Program Affiliations of Teacher Candidate Survey Respondents

Teacher Preparation Program Affiliation	Percent of Pilot Sample (Phase 1)	Percent of Validation Sample (Phase 2)
Early Childhood Education	13.3%	17.3%
Elementary Teacher Education	86.4%	80.6%
Secondary Science Education	0.0%	2.1%
Sample Size	60	284

Lastly, during this first analytic phase of the project

[Step 6 in Table 1], the research team thematically evaluated the remaining 40 items that appear on both the clinical educator and teacher candidate parallel versions and the three additional items that were only presented to clinical educators. Using a consensus building approach among experts, we grouped items that referred to similar content or theory to devise eight hypothetical or proposed subscales of the survey. The first six subscales were thematically grouped by relevant research topics. The seventh subscale is made up of items that relate to the various types of teaching approaches that can occur during coteaching (i.e., stepping up versus stepping back during instruction; or solo teaching compared to assisting instruction or coteaching). This group of items is purposefully diverse in nature to understand better the frequency of use for these different teaching approaches across coteaching settings. The eighth subscale is comprised of items that ask the respondent to reflect more generally on the coteaching experience and its primary components. Again, this last group of items is a purposefully diverse collection. Due to the intentionally broad scope of the last two subscales, we did not include these items in the next phase of analysis as their underlying group variable will not be represented by a theoretically driven latent variable in the factor model and will be described as survey subsections moving forward to delineate from the first six instrument subscales.

After this sequential, mixed methods analytic review, the revised survey instrument was comprised of 40 parallel items for teacher candidates and clinical educators and three additional items only for clinical educators across eight subscales. The subscales included the following topical collections of items: *Equality in the Classroom*; *Learning Opportunities for Students*; *Connecting Theory to Practice*; *Coteacher Collaboration*; *Professional Development*; *Personal Pedagogical Skill Development*; *Types of Teaching*; and *General Coteaching Practices*. Each subscale has between four and six items. Sample items from each subscale are shown in Table 6. [Authors' Note: Researchers interested in deploying this coteaching survey in research settings should contact the first author for a copy of the entire survey instrument.] Internal reliabilities of each of the eight subscales are presented in Table 7.

Confirmatory Factor Analysis

Analysis Phase 2. During the subsequent rounds of data collection over the following four semesters of coteaching placements [Step 7 in Table 1], we sought to collect enough survey responses to have a robust sample for CFA to validate the model of the proposed subscales, or factors, devised in Analysis Phase 1. Employing the 40 parallel items plus three additional items version of the survey, we gathered responses from 284 teacher candidates and 306 clinical educators for a total of 590 responses, satisfying the recommended sample size for CFA per the various guidelines described earlier. Demographic details of the Analysis Phase 2 sample are found in Tables 4 and 5.

Subsections 7 and 8 (*Types of Teaching and General Coteaching Practices*) are purposefully diverse for the collection of more logistical data related to the frequency of particular teaching approaches and more general reflections on the coteaching experiences, and as such, are not included for the following item analysis and CFA. As in Analysis Phase 1, we first reviewed the Analysis Phase 2 data via item analysis, especially the item-total correlations [Step 8 in Table 1]. No items were identified for possible removal using the established guidelines. See Table 8 for all item-total correlations from Analysis Phase 2.

Finally, a CFA was conducted on the full data set [Step 9 in Table 1]. The initial model fit indices showcase poor fit for the data across many indices (N=590; $\chi^2(390)$ = 2776.7; p = .001; CMIN/DF = 7.12; normed fit index (NFI) = .808; comparative fit index (CFI) = .830; root mean square error approximation (RMSEA) = .102 (90 percent confidence intervals of .098 and .106); SRMR = .0765; AGFI = .668; PCFI = .744. These initial findings are summarized in Table 9. To improve the model fit, correlations were added between several items on the same subscale (e.g., between item 1 & 6; between 15 & 17; and between 20 & 21) for a total of 19 correlations allowed according to the modification indices from AMOS (Kline, 2005). The model fit improved and the fit guidelines were deemed acceptable to great for all indices.

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After this sequential, mixed methods analytic review, the revised survey instrument was comprised of 40 parallel items for teacher candidates and clinical educators and three additional items only for clinical educators across eight subscales.

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Table 6
Sample Items of Survey by Subscale

Subscale #1 – Equality in the Classroom

7. A mutual sense of respect was developed between my coteacher and me.

15. I viewed my coteacher as a colleague.

8. My coteacher and I developed a coresponsibility for meeting our students' needs.

Subscale #2 – Learning Opportunities for Students

1. Coteaching provided more opportunities for students to learn.

6. Coteaching helps the students learn content more effectively.

18. Coteaching allowed the students to get the help they needed.

Subscale #3 – Connecting Theory to Practice

5. Coteaching allowed me to link educational theory to practice.

31. We discussed what we learned about ourselves and our teaching practice.

32. We shared the reasons behind instructional decisions.

Subscale #4 – Coteacher Collaboration on classroom issues

10. My coteacher and I discussed issues that impacted our teaching.

29. We decided together to change upcoming lessons because they weren't working as desired.

30. We collaborated to determine student needs.

Subscale #5 – Professional Development

2. Coteaching provided opportunities for my coteacher to grow as a teacher.

3. Coteaching provided opportunities for me to grow as a teacher.

16. My coteacher provided insight and knowledge that improved my own teaching.

Subscale #6 -- Personal Pedagogical Skill Development (specific)

36. The coteaching experience showed me new ways to integrate literacy into my classroom.

39. I improved my understanding of how to utilize technology in my classroom.

40. Coteaching has shown me new ways to build student engagement.

Purposefully diverse sections:

Subsection #7 – Types of Teaching

22. I solo taught.

34. I stepped up to take the lead instructional position.

35. I stepped back to take a supportive instructional position.

Subsection #8 – General Coteaching Practices

26. We coplanned instruction.

27. We coreflected on the effectiveness of lessons for student learning.

28. We coevaluated our own teaching practices.

Authors' Note: Researchers interested in deploying this coteaching survey in research settings should contact the first author for a copy of the entire survey instrument.

Table 7
Phase 1 Statistics and Internal Reliability by Scale

Subscale	Mean	Standard Deviation	Cronbach Alpha
1	4.34	.74	.888
2	4.38	.63	.867
3	3.91	.69	.795
4	4.24	.61	.839
5	4.17	.62	.837
6	3.64	.87	.879
7*	3.43	.45	.594
8*	4.03	.53	.716

Note: *Subscales 7 and 8 are intentionally diverse in scope.

Table 8
Phase 2 Item-Total Correlations

Item #	Item-Total Correlation
Q01	.637
Q02	.603
Q03	.692
Q04	.705
Q05	.693
Q06	.647
Q07	.655
Q08	.719
Q09	.752
Q10	.637
Q11	.685
Q12	.715
Q13	.638
Q14	.722
Q15	.620
Q16	.692
Q17	.594
Q18	.633
Q19	.634
Q20	.626
Q21	.664
Q29	.450
Q30	.610
Q31	.590
Q32	.584
Q33	.550
Q36	.600
Q37	.593
Q38	.592
Q39	.526
Q40	.605

Finally, a CFA was conducted on the full data set [Step 9 in Table 1]. The initial model fit indices showcase poor fit for the data across many indices (N=590; $\chi^2(390)$ = 2776.7; p = .001; CMIN/DF = 7.12; normed fit index (NFI) = .808; comparative fit index (CFI) = .830; root mean square error approximation (RMSEA) = .102 (90 percent confidence intervals of .098 and .106); SRMR = .0765; AGFI = .668; PCFI = .744. These initial findings are summarized in Table 9. To improve the model fit, correlations were added between several items on the same subscale (e.g., between item 1 & 6; between 15 & 17; and between 20 & 21) for a total of 19 correlations allowed according to the modification indices from AMOS (Kline, 2005). The model fit improved and the fit guidelines were deemed acceptable to great for all indices.

The final model fit indices upon a preliminary review displayed mixed findings (N=590; χ^2(398) = 1647.7; p = .001; CMIN/DF = 4.14; NFI = .901; CFI = .912; RMSEA = .073 (90 percent confidence intervals of .069 to .077); SRMR = .066; AGFI = .806; PCFI = .781. These indices disagree as a significant χ^2 value indicates poor fit, but the other indices fall within acceptable, good, or excellent ranges. Based on the majority of model fit indices, it was determined that the proposed six-factor model is a good representation of the data analyzed. These initial and final model fit indices are summarized in Table 9.

Table 9
Phase 2 CFA Model Fit Indices

Fit Index	Initial Model	Interpretation	Final Model	Interpretation
χ^2 p value	.001	Poor	.001	Poor
CMIN/DF	7.12	Poor	4.14	Good
NFI	.808	Poor	.901	Good
CFI	.830	Poor	.912	Good
RMSEA	.102	Poor	.073	Acceptable
SRMR	.077	Acceptable	.066	Good
AGFI	.668	Poor	.806	Acceptable
PCFI	.744	Good	.781	Good

The results of the two phases of analysis demonstrate that the coteaching survey is a valid and reliable instrument to measure perspectives and experiences of coteaching with following scales: Equality in the Classroom; Learning Opportunities for Students; Connecting Theory to Practice; Coteacher Collaboration; Professional Development; Personal Pedagogical Skill Development; Types of Teaching; and General Coteaching Practices.

Examination of the model more deeply shows that each item of the survey has a statistically significant loading onto its relevant construct. Most factor loadings, or regression weights, are at least .60, with many weights in the .75-.85 range. Regression weights for Q29 and Q33 are slightly lower; however, they are still statistically significant. In future analyses, the inclusion of these items may be revisited, but there is enough evidence to continue to include in this factor. The generally large regression weights indicate there is a strong theoretical connection between each of the items and the related theoretical construct. Overall, the use of confirmatory factor analysis shows strong support for the six subscales, or latent variables, present in the portion of the instrument analyzed.

The covariances for the current model also were consulted. AMOS labels the critical ratio as C.R., but this is synonymous with the t-statistic or Wald statistic. Any parameter that has an absolute value of less than 2 for its C.R. indicates that it lacks statistical significance (Stevens, 1996). All values for the current model are above 2; however, some of the covariances between disturbances are approaching this value.

Lastly, a possible threat to this model is the high correlations between a few of the examined subscales as seen in Table 10. When latent variables are so highly correlated, this may indicate the need for an advanced second order factor model (Brown, 2006). This consideration may be taken into account for future analyses to eliminate this high correlation.

Discussion

The results of the two phases of analysis demonstrate that the coteaching survey is a valid and reliable instrument to measure perspectives and experiences of coteaching with following scales: *Equality in the Classroom*; *Learning Opportunities for Students*; *Connecting Theory to Practice*; *Coteacher Collaboration*; *Professional Development*; *Personal Pedagogical Skill Development*; *Types of Teaching*; and *General Coteaching Practices*. The last two sections are purposefully diverse to collect information on the frequency of relevant coteaching activities.

Our analyses and findings contribute to the existing knowledge base in coteaching by developing a set of scales as part of a valid and reliable measure of coteaching, which to date, does not exist in the literature. Though teacher education programs across the globe have introduced coteaching as a model for student teaching, in part because it promotes collaboration between teachers and emphasizes reflective practice (Guise et al., 2017), there

Table 10
Phase 2 Statistics and Internal Reliability by Scale

Subscale	Mean	Standard Deviation	Cronbach Alpha
1	4.20	.77	.869
2	4.28	.69	.863
3	3.91	.75	.835
4	4.15	.65	.852
5	4.13	.74	.876
6	3.56	.93	.925
7*	3.49	.47	.648
8*	3.93	.56	.766

Note: *Subscales 7 and 8 are intentionally diverse in scope.

are no psychometrically developed survey instruments to evaluate teacher candidates' and clinical educators' coteaching experiences. Researchers have found that fundamental to coteaching is the expectation that coteachers will plan and implement instruction together and reflect upon how instruction has impacted student learning (Badiali & Titus, 2010; Tobin & Roth, 2006). Our instrument directly relates to the need to assess whether these essential components are existent in the model. For example, the two subscales *Connecting Theory to Practice* and *Coteacher Collaboration* ask coteachers for their perceptions of whether they discussed their pedagogical and curricular choices, reflected upon how theory can influence practice, and if they shared decision making about student learning and instruction during the coteaching placement. The coteaching model assumes that teachers will engage in these activities, yet we have limited empirical evidence to determine whether these practices actually occur during a student teaching placement. The future use of our instrument will allow researchers to make more valid claims regarding the presence of such activities during coteaching placements.

Over a decade ago, Scantlebury et al. (2008) identified corespect and coresponsibility as critical components for successful coteaching experiences, yet even today no researchers have posited approaches to assess corespect or coresponsibility. This new instrument addresses the dearth of tools for further examination of the coteaching model. For example, the *Equality in the Classroom* scale addresses this aspect of coteaching by asking coteachers whether they shared the teaching space, the responsibility for planning and implementing instruction, and their perception of the professional relationship between coteachers. The insights gleaned from these items will enable researchers to determine if the model is functioning as expected and if coteaching is providing optimal opportunities for the development of collaborative expertise (Soslau et al., 2018) through the use of shared responsibility across all aspects of coteaching.

Teacher education programs cite the potential of coteaching as an avenue to improving student learning outcomes because clinical educators remain in the class with the teacher candidate. Thus, coteaching reduces the student to teacher ratio, takes advantage of all the human capital in the classroom, and thus increases students' learning opportunities (Hartnett et al., 2014). Again, this tool is the first of its kind to actually explore if this intended outcome is coming to fruition in cotaught classrooms. The scale titled *Learning Opportunities for Students* scale focused on whether coteachers perceived that their students had increased learning opportunities through a variety of teaching practices and access to more than one instructor which may not occur in a traditional student teaching arrangement. Positive results on this scale would work toward confirming *all* available teaching resources are being leveraged to attend to individualized students' needs in ways that would prove difficult for a single teacher.

The future use of our instrument will allow researchers to make more valid claims regarding the presence of such activities during coteaching placements.

One possible utilization of the coteaching survey could identify teachers with fewer positive perspectives on coteaching for targeted intervention and professional development to improve their readiness to act as an effective coteacher. Additionally, if deployed early in the program, the coteaching survey could identify confusion within coteachers' understandings related to the goals of using coteaching in a student teaching arrangement.

Qualitative studies (Gallo-Fox & Scantlebury, 2015; Scantlebury et al., 2008) have documented that successful coteaching provides professional development for teacher candidates and clinical educators. Teacher candidates can bring subject matter expertise to facilitate the teaching of science in primary schools (Murphy & Beggs, 2010), knowledge of new technologies or curricular innovations, or by having more human resources in the classroom. Teachers are in a position to take 'risks' in implementing new methodologies or pedagogical approaches (Scantlebury et al., 2008). Through these avenues, coteachers report on the value of having a colleague with whom they can discuss questions of teaching and learning in a local context. Thus, coteachers have *Professional Development* (subscale #5) experiences while engaged in coteaching (Gallo-Fox & Scantlebury, 2015). These experiences can also lead to teachers' noting an increase in their *Personal Pedagogical Skill Development* (subscale #6) as a result of the collaborative learning environment for teacher candidates and clinical educators alike.

The subsection *Types of Teaching* addresses whether coteachers are engaged in different roles during the coteaching experience. A coteacher may take the lead in instructing a class, assume a peripheral role by stepping aside and working with a group of students, be a spectator, or engage as an expert (Tobin, 2006). The *Types of Teaching* subscale also asked coteachers to indicate if they had any of these different teaching experiences. The *General Coteaching Practices* subsection asked teachers to indicate if they shared in evaluating aspects of their coteaching experiences such as lesson planning and implementation. Future studies employing this survey instrument might explore comparisons between responses with high and low frequency of different coteaching practices highlighted in subsection 7 and 8, such as the prevalence of coevaluation (item 28). A hypothetical study could investigate broader patterns of responses across the established subscales #1 to #6 using coevaluation frequency (item 28) as a predictor or independent variable. Use of this survey instrument in such a method could inform a deeper understanding of the impact of coevalution within the coteaching model–a stated need in the coteaching research literature (e.g., Drewes et al., 2020).

A limitation of this study is that the sample parameters of this specific university context resulted in a majority of respondents being elementary and middle school teachers with fewer high school teachers. We agree with the belief stated by Andrews and colleagues (2017) that "survey validation is a continuous process" (p. 16) and, as such, this survey could benefit from additional validity evidence that encompasses more high school coteaching respondents. Future studies should expand the scope to include a more diverse target population across grade levels and content areas.

Another limitation is that this survey instrument does not incorporate student (K-12 pupil) learning outcomes or student beliefs. Students are experts in their own classrooms and can provide important insights on the classroom learning environment (Bayne, 2012). We recommend future work along this path to better incorporate perspectives of all coteaching stakeholders (e.g., Drewes et al., 2020) and to connect analysis of this survey's findings to other data such as student achievement or teachers' performance criteria.

The implications of the practical application and use of these scales, and the instrument they constitute, are manyfold. One possible utilization of the coteaching survey could identify teachers with fewer positive perspectives on coteaching for targeted intervention and professional development to improve their readiness to act as an effective coteacher. Additionally, if deployed early in the program, the coteaching survey could identify confusion within coteachers' understandings related to the goals of using coteaching in a student teaching arrangement.

We also posit that if open response spaces were continued to be included, the survey could serve as a reflective space to initiate ongoing conversations between teacher educators, clinical educators, and university personnel involved with teacher education programs and field experiences. Both coteachers (candidate and clinical educator) could use the survey items as a form of reflective self-assessment throughout the student teaching experience to judge how well they are implementing the model. These self-assessments could be shared as a way to collaborate around improving the model and to scaffold individual and collaborative introspection on problems of practice. Pairing discussions of survey responses

with a framework such as the Guide for Reflective Practice (Greenberger, 2020) may also be particularly generative for documenting and improving teachers' reflective practice.

The survey items can also be introduced during professional development sessions with teacher candidates and clinical educators as a way to inform participants about the intended functions, features, and outcomes of the coteaching model. These are several ways that teacher educators can practically apply the instrument and avenues for future research, which could incorporate the coteaching survey to improve coteaching experiences and teacher preparation models more broadly.

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