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Feature Article

Student Teacher Engagement in Co-Teaching Strategies

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Abstract

Recently there has been increasing emphasis on co-teaching experiences for teacher candidates. Despite the significance of collaboration between cooperating teachers and student teachers, limited empirical attention has focused on student teachers' co-teaching experiences. The following study utilized survey data to ascertain if student teachers' use of different co-teaching strategies changed over the course of their student teaching semester, as well as, compared student teacher use of co-teaching strategies in elementary, middle, and secondary program areas. *Pilot Study Survey* data revealed that approximately one-fourth of the student teacher's time is spent teaching alone. However, the *Student Teacher Survey* data indicated that the Team Teaching co-teaching strategy increased more than any other co-teaching strategy in all program areas. The study concludes that as teacher education programs seek to maximize the benefits of the co-teaching model, student teachers and cooperating teachers need additional training in ways to utilize all the co-teaching strategies to maximize student learning.

Keywords: student teaching, teacher education, co-teaching

To prepare teacher candidates to work with diverse populations of P-12 students, teacher educators are incorporating a variety of clinical-based experiences into teacher preparation and introducing teacher candidates to authentic instructional practices before entering the teaching field. Co-teaching, defined as "two or more professionals working together to deliver instruction to a diverse, or blended, group of students in a single physical space" (Cook & Friend, 1995, p. 14), is recognized as a promising delivery model to support the development of inclusive classrooms, (Strogilos & Tragoulia, 2013; Thousand, Villa, & Nevin, 2007) as well as an auspicious approach to prepare teacher candidates. Co-teaching has long been implemented with a special focus on satisfying the needs of diverse learners, such as students with disabilities and English language learners in general educational settings (Hughes & Murawski, 2001; Isherwood & Barger-Anderson, 2008; Murawski & Swanson, 2001; Pardini, 2006). In recent decades, co-teaching served as a beneficial approach for student teachers by facilitating teacher candidates' understanding of subject-specific pedagogy and the value of collaborative planning in clinical practice (Bacharach, Heck, & Dahlberg, 2008; Rytivaara &

Kershner, 2012).

Given various types of effective collaborative models identified in the literature (Zigmond & Magiera, 2001), the present study is concerned with a group of student teachers' self-reported use of co-teaching strategies at various points of time during the student teaching semester. Specifically, we investigate if and how the professional roles and responsibilities of the student teachers changed over the course of their clinical involvement.

We also identified the unique features of the ways that co-teaching models were employed at elementary, middle, and secondary levels.

Literature Review

The following literature review explores research detailing the effectiveness of co-teaching and its various models in practice. The challenges of co-teaching and lack of parity in such efforts are also documented, followed by a discussion of the impact that co-teaching during pre-service has on future teaching at the in-service level.

As the popularity of the co-teaching model increases (Kentucky Administrative Regulation, 2012), research has documented the positive effects of co-teaching, such as the increased flexibility in scheduling, more observed positive social interaction, and the cultivation of a sense of collegial support for professionals involved (Dugan & Letterman, 2008; Zigmond & Magiera, 2001). In addition, findings show that educators engaged in co-teaching practice are better able to provide accommodations to meet the diverse needs of learners (McHatton & Daniel, 2008). For instance, Mageria and Zigmond's (2005) observational study on student-teacher interactions reported that students with disabilities interacted significantly less than students without identified disabilities with the general education teacher, but these students received more individual instruction during co-teaching. Further research found that students in co-taught classrooms statistically outperformed students in traditional class settings in reading and math in the Minnesota

Comprehensive Assessment and the Woodcock-Johnson III psychoeducational battery tests of academic achievement (Bacharach, Heck, & Dahlberg, 2008).

Co-teaching also encouraged teacher candidates to reflect on their own personalities and engaged in healthy interactions and negotiations with mentors when differences in personality occurred (Kamens, 2007). In addition, co-teaching experiences provided a context for advancing both co-teachers' professional learning and leading to a joint knowledge construction that may result in new ideas in practice. The collaborative nature of co-teaching enables teachers to share and create knowledge through experimenting with innovative ideas in practice and reflection. Teachers are also able to implement the principles of cooperative learning during co-teaching. Co-teaching may also support teachers to meet their professional responsibilities more efficiently, since these seemingly small experimentations can be significant steps toward a bigger change in a teacher's thinking, beliefs and practice—steps in their professional development (Rytivaara & Kershner, 2012).

Co-Teaching Strategies

The extant literature has also highlighted several different strategies for co-teaching that work in a variety of settings, depending on the degree of the collaboration (Friend & Cook, 2010; Villa, Thousand, & Nevin, 2013; Zigmond & Magiera, 2001). For example, Friend and Cook (2010) indicate that co-teaching includes the professionals planning and delivering instruction using seven approaches and variations of them. These approaches to co-teaching include:

1. *One Teach, One Observe*: One co-teacher leads large group instruction, while the other observes and gathers social, academic, or behavioral data on specific students or the class group.
2. *One Teach, One Assist*: One teacher leads instruction, while the other co-teacher circulates among the students and provides

individual assistance.

3. *Station Teaching*: The instruction is divided into three non-sequential parts. Students are divided into three groups and rotate from station to station. Two co-teachers teach at two stations, leaving the third group to work independently.

4. *Parallel Teaching*: Each teacher is with half the class group and presents the same material with the primary purpose of fostering instructional differentiation and increasing student engagement.

5. *Alternative Teaching*: One teacher works with the majority of the students, while the other works with a small group for remediation, enrichment, assessment, or other purposes.

6. *Supplemental Teaching*: Students are divided into groups based on their assessment data, with one teacher working with a large group of students and the other working with the rest of the students to provide further challenge or remediation.

7. *Team Teaching*: Both teachers lead large-group instruction by both lecturing, illustrating two ways to solve a problem, representing opposing views in a debate, or various other strategies where both teachers have equal amounts of control and input in the teaching and learning process.

It is recommended that teacher candidates and mentors should use various co-teaching strategies depending on student needs and instructional intent (Friend & Bursuck, 2009; Friend & Cook, 2010). Within these seven approaches, co-teachers can provide varied and differentiated instructional practices to meet the individual needs of students (Friend, 2014). The most prominent and most frequently cited co-teaching model according to Scruggs, Mastropieri, and McDuffie's (2007) meta-synthesis study was the One Teach, One Assist co-teaching model and its variations. The less frequently implemented models were *Team Teaching, Station Teaching and Alternate Teaching*.

Co-Teaching During Student Teaching

Traditionally, the student teaching is defined as "a master teacher who gradually releases responsibility of classroom instructing to the student teacher, often with an extended period of 'take-over'" (Guise, Habib, Thiessen, & Robbins, 2017, p. 374). Cooperating teachers provided space for student teachers to implement instruction and receive feedback. St. Cloud State University pioneered the co-teaching model in the student teaching context (Heck, Bacharach & Dahlberg, 2008). This format of co-teaching is defined as two teachers, a cooperating teacher and a teacher candidate/student teacher, working together in a classroom with groups of students, while sharing the planning, organization, delivery and assessment of instruction, as well as the physical space (Heck, Bacharach, Mann, & Ofstedal, 2005).

The co-teaching practice at the pre-service level has generated increasing research interest. The existing research on teacher candidates' co-teaching training highlighted student teachers' negative reflection and anxiety toward their co-teaching practices (Strogilos & Tragoulia, 2013), while some studies showed that student teachers could overcome their initial concerns about co-teaching and build stronger partnership with their cooperating teachers (e.g. Kamens, 2007). During student teaching, teacher candidates reported they became more open-minded and embraced increasingly positive attitude toward the collaborative internship (Shin, Lee, & McKenna, 2015; Strogilos & Tragoulia 2013).

The changing nature of teaching and learning and the power dynamics between the cooperating teacher and student teacher may lead to the complexity of co-teaching practices. For instance, the cooperating teachers were often positioned as the evaluator and the "supervisor of practica" (Borko & Mayfield, 1995, p.9), while student teachers may subsequently assume a subordinating role. The power differential in these environments may influence the degree of the collaboration in planning and instruction (Gardiner

& Robinson, 2009) and the formation of co-teaching relationship with "co-respect and co-responsibility" (Guise, Habib, Thiessen, & Robbins, 2017, p. 372). Roth and Tobin (2004) presented a praxis of co-teaching and co-generative dialoguing that was particularly suited for analyzing complex practices and the nature of cooperating teacher and pre-service teacher's debriefing. During type of dialoguing, both co-teachers engage in the discussion and collectively generate solutions to problems (Scantleburg, Gallo-Fox, and Wassell, 2008). According to Roth and Tobin (2004), co-generative dialoguing has potential for "enlarging the subjective possibilities" and "produces recommendations for concrete actions and change that teachers experience as an opening of their possibilities" (p. 175).

The recent study from Guise, Habib, Thiessen, and Robbins (2017) proposed a continuum of the relationship between the cooperating teacher and the student teacher based on the degree of student teachers' involvement of co-teaching. According to the role of co-operating teachers in mentoring a pre-service teacher and power differentials of two parties involved, the co-teaching practices were observed fell into four categories—traditional student teaching, blended experience, forward momentum, and scaffold and grow. The first one involved mainly solo teaching and unidirectional learning, while the last one was framed as a social practice with a more equal power dynamic that allows both co-operating teacher and the student teacher to mutually engage in a co-generative dialogue and form a community of learners (Guise, Habib, Thiessen, & Robbins, 2017). Arshavskaya (2014) argued that though the novices can obtain the on-the-spot critical emotional and professional support through the shared co-teaching and co-reflecting experiences with mentors, dialogues sometimes revealed certain contradictory beliefs, which the pre-service teachers continued to hold even at the end of the teaching practicum.

As previous studies have indicated, educators in a co-teaching team use a variety of co-teaching strategies and the responsibilities of each team member varies (Pancsofar & Petroff, 2016; Villa, Thousand & Nevin 2007), recent scholarship began to focus on the frequency of teacher candidates' use of co-teaching strategies and its variation among different grade levels or program areas. In Stobaugh and Gichuru's study (2016), the researchers investigated how elementary, middle, and secondary student teachers engaged in different co-teaching models using self-reported data. The study examined student teachers' and cooperating teachers' perceptions of co-teaching. Data showed there were no significant differences between the student teachers' and cooperating teachers' perceptions.   The researchers pointed out that some of the previously proposed co-teaching model descriptions did not clearly reveal the experiences of student teachers. For instance, with the *One Teach, One Observe* model, the cooperating teacher could lead instruction while the student teacher observes or the student teacher could instruct with the cooperating teacher observes. Specifically, Stobaugh and Gichuru (2016) refined the descriptions of *One Teach, One Observe* and *One Teach, One Assist* models and divided the descriptions of original two models into three:

- *Student Teacher Teaches Alone (Solo Teaching)*– The student teacher has the primary instructional responsibility while the cooperating teacher gathers specific observational information. (Formerly One Teach, One Observe)
- *Student Teacher Observes*– The cooperating teacher is the primary teacher while the student teacher gathers specific observational information. (Formerly One Teach, One Observe)
- S*tudent Teacher Assists*– The cooperating teacher has primary instructional responsibility of leading instruction while the student teacher assists students with their work, monitors behaviors, or corrects assignments. (Formerly One Teach, One Assist)

This revised instrument, utilized in this study, revealed the complexity of co-teaching models in the context of student-teaching. To further the understanding of the dynamics within a co-teaching union, more research on different aspects of the professional collaboration between student teachers and cooperating teachers is critically needed to precisely identify and address variables influencing co-teaching implementation at different grade levels.

In all, despite the significance of collaboration between the cooperating teachers and teacher candidates, limited empirical attention has focused on teacher candidates' co-teaching experiences (Shin, Lee, & McKenna, 2015). To date, only the handful of studies mentioned above (Pancsofar & Petroff, 2016; Stobaugh & Gichuru, 2016; Villa, Thousand & Nevin 2007), have specifically examined the frequency of student teachers' use of different co-teaching strategies and the variance among grade levels or program areas. This gap needs to be bridged to gain a more comprehensive picture of how co-teaching can be effectively implemented in classrooms and to maximize co-teaching effectiveness in teacher preparation programs and beginning teacher internship training

Present Study

Cultural psychologists believe that people learn through participating in daily sociocultural activity (Bruner, 1996; Vygotsky, 1978). Lave and Wenger's notion of situated learning (Lave & Wenger, 1991) and social constructivism (Bruner, 1996; Vygotsky, 1978) served as the theoretical framework for this study.

Lave and Wenger (1991) offered a social practice theory and viewed learning as a situated activity, since "learners inevitably participate in communities of practitioners and that mastery of knowledge and skill requires newcomers to move toward full participation in the sociocultural practice of a community" (p. 29). They introduced the notion of legitimate peripheral participation to describe how newcomers become experienced

members of a community of practice or collaborative project. Situated at the periphery of communities, social beings are not yet full members. They learn the culture and norms of the social group by observing and through apprenticeships. They become increasingly competent through their evolving participation and eventually gain membership or access to the community. This changing participation leads individuals to take on new identities that are necessarily bound up with new knowledge and skills (Lave, 1996). Student teaching is considered a form of apprenticeship and other teacher candidates are learning how to become experienced professionals through the collaborative relationship with cooperating teachers in a variety of education settings. In the current study, we employ Lave and Wenger's (1991) notions of situated learning as a lens to examine teacher candidates' changing participating in co-teaching activities throughout their apprenticeship.

This research study utilized survey results to determine student teachers' use of different co-teaching strategies prior to student teaching and during student teaching along with the comparison of the use of co-teaching strategies among student teachers' respective teacher education program areas such as elementary, middle, and secondary education. Due to no statistically significant differences between the cooperating teachers' and student teachers' perceptions of co-teaching in (Stobaugh & Gichuru, 2016) this study focused exclusively on the student teachers' perspectives rather than both the student teachers' and cooperating teachers' perspectives. The following research questions guided this focus:

1. How do student teachers (as delineated by their respective program areas: elementary, middle grades, and secondary grades) differ in their use of the *eight* co-teaching strategies *during* student teaching?
2. How do student teachers (as delineated by their respective program areas: elementary,

middle grades, and secondary grades) differ in their use of *seven* co-teaching strategies *prior* to student teaching compare to the use of strategies *during* student teaching?

3. How do student teachers (as delineated by their respective program areas: elementary, middle grades, and secondary grades) vary in their choices of *seven* co-teaching strategies *during* student teaching?

Method

The teacher preparation program that provided the context for this study is a four-year bachelor program in a large, comprehensive, and public university in the southeastern region of the United States. As a part of the Kentucky school statute, all teacher candidates are required to have 200 hours of clinical experience prior to student teaching. In addition, the state required all cooperating teachers who host student teachers to be trained in the various co-teaching approaches by 2013. Kentucky Administrative Regulation 5:040 states that

The educator preparation institution shall provide opportunities for the student teacher to assume major responsibility for the full range of teaching duties, including extended co-teaching experiences, in real school situations under the guidance of qualified personnel from the educator preparation institution and the cooperating elementary, middle, or high school. (Kentucky Administrative Regulation, 2012)

As result of this Kentucky statute, the university trained all cooperating teachers, student teachers, and university teacher education faculty on the co-teaching model. Before student teaching, teacher candidates utilize co-teaching strategies as they teach lessons, observe teachers leading instruction, lead small intervention groups, and assist teachers.

During the student teaching semester, teacher candidates are placed throughout neighboring K-12 schools. Prior to receiving their teaching certificate, student teachers must complete the final semester of coursework in this placement by working with their cooperating teachers who serve as their mentors to refine their teaching skills. At the time of data collection, all participants were enrolled in the culminating undergraduate teaching methods course offered through the School of Teacher Education during their student teaching semester.

Data Collection and Sample

Two sets of survey data were collected: (a) the Pilot Survey; and (b) the Student Teacher Survey. The Pilot Survey, administered in the middle of the Fall 2014 student teaching experience, aimed to present new labeling for the co-teaching strategies (see Figure 1). Student teachers were to identify the extent of their exposure and involvement by reporting the time spent on each co-teaching strategy. The Pilot Study used the revised eight co-teaching strategies proposed by Stobaugh and Gichuru (2016), including S*tudent Teacher Teaches Alone (Solo Teaching), Student Teacher Observes, Student Teacher Assists, Station Teaching, Parallel Teaching, Supplemental Teaching, Alternative Teaching,* and *Team Teaching*.

Participants identified their certification level: elementary, middle, or secondary. The survey then asked participants to identify the number of hours student teachers and cooperating teachers planned together per week from one to six hours. Finally, participants were asked to assess the percentage of time they spent engaging in each of the seven co-teaching strategies from 0% to 100% in ten percent increments. As a reminder to the participants, the co-teaching strategies were defined at the bottom of the survey. The Pilot Survey was given only in Fall 2014 to determine if the proposed eight co-teaching categories provided a richer data source to analyze the co-teaching practices of student teachers. The measures in the Pilot Study investigated whether there were any differences of co-teaching approaches over the course of teacher training. The intention was to examine the relationship between co-teaching strategies and different uses in program areas.

The participants in the Pilot Student Teacher Survey included: elementary education (n=55), middle grades education (n=20), and secondary education (n=14) student teachers, with a total of 89 participants. The response rate was an acceptable 61%.

The second set of data was collected through the Student Teacher Survey (see Figure 2). The Student Teacher Survey is administered at the close of the student teaching semester, so all teacher candidates could reflect on their use of the co-teaching strategies in clinical experiences prior to their student teaching and during student teaching. Completion of this survey was required by the teacher education department and has been in place for several years. An addition of co-teaching items to the survey occurred in 2012 to assess the level of co-teaching during student teaching. The survey, administered Fall 2012 through Spring 2016, represented four years of data. The seven co-teaching strategies used on the survey included: *One Teach, One Observe; One Teach, One Assist; Station Teaching; Parallel Teaching; Supplemental Teaching; Alternative Teaching;* and *Team Teaching*.

Student teachers were asked to evaluate the implementation of the co-teaching strategies both before and during student teaching using the following rubric indicators: Extensive Exposure—Very comfortable with the model and successfully used it during student teaching (4 level); Moderate Exposure—Somewhat comfortable with the model and tried to use it during student teaching (3 level); Minimal Exposure—Not Comfortable with the model and did not use it during student teaching (2 level); and None At All—Limited or no exposure to the model (1 level).

The participants in the Student Teacher Survey included elementary education (n=567), middle grades education (n=148), and secondary education (n=316), for a total of 1,031 participants (Table 1). The survey, administered Fall 2012 through Spring 2016, supplied four years of data. The response rate was slightly higher at 67% than the Pilot Survey response rate of 61%.

Table 1.

Characteristics of Study Samples

Survey and Number	Program Area	Sample Size
Pilot Survey (N=89)	Elementary Education	**55**
	Middle Grades Education	20
	Secondary Education	14
Student Teacher Survey (N=1031)	Elementary Education	567
	Middle Grades Education	148
	Secondary Education	316

Variables

In the Pilot Survey, the co-teaching strategies were interval scales as participants were assessing the level of implementation of each model during the student teaching semester based on 10 percent increments. In the second instrument, the Student Teacher Survey, the variable was also an interval scale, with student teachers rating from 1 to 4 on a rubric their level of implementation of each of the co-teaching strategies.

Analyses

To answer the first research question, which used the pilot data, beta regressions were conducted (Ferrari & Cribari-Neto, 2010). The dependent variable is a percentage at the individual response level which is inappropriate for a typical linear regression or Analysis of Variance-based (ANOVA) model. The beta regression approach used a regression structure but assumed the dependent variable followed a beta distribution. This model incorporated the additional estimation of a parameter φ, or precision parameter, which related to the shape of the beta distribution best fitting the data. Its' value is immaterial to

interpretation of results in this research project. With this approach, homoscedasticity or non-normality of residuals were irrelevant. Outliers or multicollinearity could be problematic, but were not issues in this study. The *betareg* package (Cribari-Neto & Zeileis, n.d.) in R software was used to estimate the beta regressions.

The remaining research questions were answering using mixed ANOVAs. Mixed ANOVAs included both repeated measures (pre- and post-ratings) and independent measures (program area). Regression models were not appropriate because of the repeated measures. A multi-level model with time-point as level 1 could have been used, but the mixed ANOVA was chosen in this case due to its greater simplicity.

Results

The results of the Pilot Survey addressed Research Question #1: How do student teachers (as delineated by their respective program areas: elementary grades, middle grades, secondary grades) differ in their use of the *eight* co-teaching strategies *during* student teaching?

Based on the Pilot Survey completed by student teachers in elementary (E), middle (M), and secondary (S), the highest percentages were in the same three co-teaching strategies: *Student Teacher Alone, Student Teacher Assists*, and *Team Teaching* (Table 2). *Student Teacher Assists* (E =21.1%; M=19%; S=18.8%) was the highest percentage for elementary student teachers. The co-teaching strategy *Student Teacher Alone* (E=19.7%; M=23.5%; H=26.1%) was the highest percentage for secondary student teachers. For *Team Teaching* (E=16%; M=28%; H=21%), middle grades student teachers reported spending the most time utilizing this co-teaching strategy. There were negligible levels of *Parallel Teaching* and *Alternative Teaching* reported for all levels.

Table 2.

Pilot Study Percentage of Student Teacher Use of Strategy

	Elementary	Middle	High
Student Teacher Alone	19.7	23.5	26.1
Student Teacher Observes	10.6	9.5	9.0
Student Teacher Assists	21.1	19.0	18.8
Station Teaching	12.5	6.0	4.6
Parallel Teaching	4.4	5.5	4.4
Supplemental Teaching	12.0	5.5	11.7
Alternative Teaching	3.7	3.0	4.4
Team Teaching	16.0	28.0	21.0

Utilizing the Pilot beta regression data displayed in Table 3 below, the only statistically significant difference was between elementary and secondary student teachers on *Station Teaching*. Elementary teachers reported higher levels of *Station Teaching* than secondary teachers.

To answer Research Questions 2 and 3, mixed model ANOVAs were used to examine the interaction between program area and seven co-teaching strategies for both the prior to student teaching and during student teaching data collections based on the end of the semester student teacher survey. In both cases, the ANOVA assumption of sphericity was violated (Greenhouse-Geisser estimate, ε = .758, .803). This suggested that variances or covariances across groups may be non-equivalent, potentially leading inaccurate p-values and, therefore, wrong conclusions. A correction to the degrees of freedom, the Huynh-Feldt estimate, thus was used (Field, 2013, p. 548) to assure p-values were accurate.

Table 3.

Pilot Beta Regression

	Estimate	Std Error	Z	P-Value
Student Teacher Alone				
Intercept	-1.187	0.088	-13.486	0
Secondary vs. Elementary	0.024	0.159	0.15	0.881
Middle vs. Elementary	0.139	0.208	0.671	0.502
Phi	5.257	0.551	9.543	0
Student Teacher Observe				
Intercept	-2.218	0.121	-18.306	0
Secondary vs. Elementary	-0.259	0.242	-1.067	0.286
Middle vs. Elementary	-0.088	0.181	-0.487	0.626
Phi	4.856	0.617	7.875	0
Student Teacher Assists				
Intercept	-1.333	0.072	-18.615	0
Secondary vs. Elementary	-0.155	0.134	-1.155	0.248
Middle vs. Elementary	-0.032	0.175	-0.184	0.854
Phi	9.544	1.021	9.345	0
Station Teaching				
Intercept	-2.078	0.128	-16.229	0
Secondary vs. Elementary	-0.793	0.25	-3.175	0.001
Middle vs. Elementary	-0.733	0.189	-3.89	0
Phi	3.882	0.523	7.428	0

	Estimate	Std Error	Z	P-Value
Parallel Teaching				
Intercept	-3.124	0.165	-18.979	0
Secondary vs. Elementary	-0.066	0.186	-0.354	0.723
Middle vs. Elementary	0.248	0.245	1.013	0.311
Phi	5.082	0.84	6.049	0
Supplemental Teaching				
Intercept	-2.01	0.102	-19.799	0
Secondary vs. Elementary	-1.067	0.241	-4.427	0
Middle vs. Elementary	-0.167	0.169	-0.991	0.322
Phi	4.856	0.617	7.875	0
Alternative Teaching				
Intercept	-3.29	0.168	-19.598	0
Secondary vs. Elementary	-0.079	0.245	-0.322	0.748
Middle vs. Elementary	0.086	0.185	0.464	0.643
Phi	5.804	0.985	5.893	0
Team Teaching				
Intercept	-1.856	0.127	-14.594	0
Secondary vs. Elementary	0.276	0.193	1.431	0.152
Middle vs. Elementary	1.094	0.254	4.297	0
Phi	2.695	0.314	8.569	0

The *prior to student teaching* data indicated that the interaction was statistically significant (F (99.64, 18.34) = 9.569, p < .001). Similarly, the interaction was statistically significant during student teaching (F (142.61,19.43) = 13.36, p < .001). These results suggest which co-teaching strategies were used more or less frequently varied by program areas and specifically provides results for Research Question #2: How do student teachers (as delineated by their respective program areas: elementary, middle grades, and secondary grades) differ in their use of co-teaching strategies *prior* to student teaching compared to the use of strategies *during* student teaching?

The use of the *One Teach, One Observe* strategy increased in all program areas. All program areas reported mean ratings above 3.0 for the observe co-teaching strategy as student teachers reported consistently high use of this strategy for both prior to student teaching and during student teaching, thus the reasoning for the strategy resulting in (a) the most utilized strategy overall, and (b) the least increased strategy of all program areas.

Student teachers reported the *One Teach, One Assist* strategy as the second most utilized strategy overall. The use of this strategy increased from prior to student teaching to during student teaching. However, the gain was a minimal increase of a 1.6 supporting the interpretation that the assist strategy is frequently used throughout the undergraduate teacher education program as well as the student teaching experience. The largest increase in the assist strategy occurred in the MGE program moving from a 3.1 to 3.7 with a gain of .6.

ELED student teachers increased their use of the *Station Teaching* strategy more than in any other program area with a rise of a .5 mean rating between prior to student and during student teaching. The MGE and SEC student teachers reported the least used strategy in both prior to student teaching and during student teaching.

All program areas increased in the use of the *Parallel Teaching* from prior to student teaching to

during student teaching. Nevertheless, the parallel strategy was reported as the least used strategy overall. Mean ratings for the parallel strategy remained below 3.0 in prior to student teaching and during student teaching in all program areas.

Student teachers in ELED and MGE programs exhibited more increase in the use of the *Supplemental Teaching* than the other program areas with mean ratings of 3.0 and 2.9, respectively. The supplemental strategy is reported as the second least used strategy overall with the parallel strategy remaining the least utilized co-teaching strategy.

Student teachers reported a low use of the *Alternative Teaching* in both prior to student teaching and during student teaching. This strategy rates as the third least used co-teaching strategy overall. There was, however, an increase in use from prior to student to during student teaching with a mean rating increase of 1.6. The use of the *Team Teaching* increased more than any of the other strategies in any program areas with a rise of 2.1. The ELED program showed the most gains with a .5 increase in the use of the team strategy from prior to student teaching to during student teaching. The team strategy was the third most utilized strategy overall.

Research Question #3 addressed: How do student teachers (as delineated by their respective program areas: elementary, middle grades, and secondary grades) relate to their choice of *seven* co-teaching strategies *during* student teaching?

Overall, student teachers reported the *One Teach, One Observe* strategy the most utilized strategy in all program areas with the *One Teach, One Assist* strategy rating the second most used. Both the *Observe and Assist* strategies produced mean ratings of at least 3.5 and above in all program areas. The ELED student teachers utilized observe and assist more than any of the other strategies with each strategy resulting in a mean rating of 3.5. The Parallel strategy was the least employed strategy by ELED student teachers with a mean rating of 2.7.

The MGE program indicated that *One Teach, One Assist* strategy was the most used with meaning ratings of 3.7. The least used strategies in the MGE program was the Supplemental strategy with a 2.7 mean rating. The SEC program data revealed similar results as observe and assist were the most used strategies with 3.6 and 3.5 mean rating and Parallel was the least used strategy during student teaching by SEC student teachers with a mean of rating of 2.5.

The SEC program student teachers made the least use of the *Supplemental* strategy when compared to the other program areas with a mean rating of 2.6. In addition, the SEC program utilized the *Alternative* co-teaching strategy less than the other program areas with a mean rating of 2.7.

Discussion

This research study examined the frequency of student teacher use of co-teaching strategies along with the variance of the strategies among teacher education program areas. The purpose was to gain insight on how co-teaching strategies could be more effectively implemented in (a) student teaching experience, (b) P-12 classrooms, and (c) teacher preparation programs. Finally, as expected with each teacher education initiative, the goal was to contribute to improved student achievement in P-12 classrooms (Willis, 2015). The three research questions provided a focus for the data collection and analysis as well as a lens to determine study outcomes. The research questions are reviewed below along with the discussion relevant to each question.

The first research question related to student teachers (as delineated by program areas) and their use of the eight co-teaching strategies during student teaching as measured by the pilot survey results. In Stobaugh and Gichuru's study (2016), student teachers at all grade levels engaged primarily in *One Teach-One Observe, One Teach-One Assist*, and *Team Teaching*. By using the eight versus the seven co-teaching strategies, the Pilot Survey revealed a clearer picture of student teachers' actions. Comparing the data from Stobaugh and

Gichuru's research (2016) with the Pilot Study results, revealed that student teachers engaged in less observation. So, perhaps the higher numbers for the *One Teach-One Observe* strategy in Stobaugh and Gichuru's study (2016) represented a mixture of the cooperating teacher observing with the student teacher teaching and other times the student teacher observing with the cooperating teacher teaching. With the extensive number of clinical hours required prior to student teaching, student teachers should be spending few hours observing, unless those are targeted observations such as observing questioning skills or discipline strategies.

The new co-teaching strategy *Student Teacher Alone* included in the Pilot Survey revealed a clear picture of the percentage of time student teachers led instruction. When the co-teaching model was first introduced, many cooperating teachers had concerns over whether student teachers would be adequately prepared to lead their own classroom if they continually had support from the cooperating teacher. The Pilot Survey data revealed that in all levels, approximately one-fourth of the student teachers' time was spent teaching alone, thus independently utilizing necessary skills to lead classroom instruction and handle classroom management issues.

In both the Pilot Study and Stobaugh and Gichuru's research study (2016), results indicated high levels of *Team Teaching* and was reported as one of most effective strategies with a classroom teacher and a student teacher collaborating, learning from one another, and advancing as professionals (Murawski, & Dieker, 2004). Additionally, in both the current study and Stobaugh and Gichuru's research (2016), *Alternative* and *Parallel Teaching* were used infrequently. Kloo and Zigmond (2008) recommended the use of a variety of co-teaching strategies including more advanced co-teaching strategies such as *Alternative* and *Parallel,* which often require advanced training to understand the best ways utilize the strategies (Mastropieri et al., 2005).

The second and third research questions

measured how student teachers differ in their use of the co-teaching strategies prior to student teaching compared to the use of co-teaching strategies during student teaching As noted in Hartnett, Weed, McCoy, Theiss, and Nickens (2013), a traditional model of student teaching includes classroom observations by the student teacher with more instructional responsibilities added to the student teacher's role with the progression of time. Therefore, it should not be surprising that the co-teaching strategy, *One Teach, One Observe,* increased in all program areas from prior to student teaching to during student teaching. The survey items did not afford student teachers the opportunity to indicate the role of the student teacher while utilizing the observe strategy, that is if the student teacher was observing the cooperating teacher or was the person being observed [name deleted to maintain the integrity of the review process]. However, the results revealed that the observe strategy is the most used strategy overall and its historical use must play a part in the frequency of its use.

These results supported Scruggs, Mastropieri, and McDuffie's (2007) findings by indicating the *One Teach, One Assist* strategy as the most frequently used co-teaching strategy both prior to student teaching and during student teaching. According to Keeley (2015), teachers utilizing the assist strategy in a co-teaching model research study perceived the strategy as the easiest co-teaching strategy to implement, which could contribute to the frequent use of the strategy identified in this study. Notable, though, were Keeley's (2015) findings through the student responses that *One Teach, One Assist* did not improve learning when compared to *Station Teaching, Parallel Teaching*, or *Team Teaching.*

The MGE student teachers reported an increase in use of the *Assist* strategy from prior to student teaching to during student teaching. During student teaching, MGE teachers seem to be either team teaching, solo teaching, or assisting. There is less utilization of the other co-teaching strategies to support diverse learning needs.

Student teachers in the ELED program reported use of the *Station* strategy both prior to and during student teaching. This is not a surprising result as early childhood programs have utilized stations, or its variation mostly known as learning centers, for many years (Lara-Cinisomo, Fuligni, Daugherty, Howes, & Karoly, 2009). The MGE and SEC student teachers reported a low use of *Station Teaching*. Typically, stations or its variations, are not used as often in the secondary program as in early learning programs such as Elementary. Elementary teachers must provide developmentally appropriate learning experiences for students and stations are effective methods to do so. The MGE and SEC students can learn at more independent levels, thus the apparent need for stations or centers may not seem as necessary as for early learners. However, the opportunity to differentiate instruction through the co-teaching *Station* strategy should not be overlooked by any grade level.

The results revealed the *Parallel Teaching* as the least used strategy overall. The *Parallel* co-teaching strategy requires more planning and collaboration between co-teachers than some of the other co-teaching strategies. Due to the nature of the strategy, co-teachers must know the learning needs of students as well as ways to differentiate content to implement the *Parallel* strategy effectively. It is possible that the cooperating teachers may need more training on this strategy to collaborate effectively with the student teacher [name deleted to maintain the integrity of the review process].

Supplemental Teaching requires one co-teacher to work with a group of students at grade level, while the other co-teacher supplements the content through reteaching, remediation, or extension (St. Cloud University, 2009). It is somewhat surprising that student teachers reported the *Supplemental* co-teaching strategy as one of the least utilized strategy both prior to student teaching and during student teaching. A reason for the lack of implementation of the S*upplemental* strategy could be a lack of co-teachers' understanding of how to

prepare for and implement this strategy. Another reason for the lack of implementation might be that the planning time for the *Supplemental* strategy could be more involved than some of other co-teaching strategies, therefore, cooperating teachers may not be able to devote extra time for planning and collaboration with the student teacher.

Alternative Teaching is another strategy in which student teachers reported minimal use in both prior to student teaching and during student teaching. The alternative or differentiated co-teaching strategy includes two different approaches to teaching the same content with the same learning outcomes for all students (St. Cloud University, 2009). A possible rationale for the low use of this strategy would be like the low use of *Parallel* and *Supplemental* co-teaching: (a) lack of training, (b) more time required for preparation, and (c) lack of initial training in the co-teaching strategy model for both the student and cooperating teachers.

The results indicated that T*eam Teaching* increased more than any other strategy in all program areas, which could indicate a positive outcome from the 2013 mandated co-teaching training for all cooperating teachers. Moreover, due to the state's high stakes accountability assessment system (Kentucky Department of Education, 2017), cooperating teachers could be hesitant to "turn over their classroom" to the less experienced student teacher, thus, employing the *Team Teaching* strategy, which would afford the cooperating teacher and the student teacher to be equal parts of the teaching and learning process with the cooperating teacher still able to support the student teacher's professional growth.

Limitations

There are several limitations with the present study. Although we have a sufficiently large sample size, the participants were from one university, which limits the generalizability of the findings. Another limitation is the lack of prior research on this topic. Many teacher education

programs utilize the special education model of co-teaching; however, this study focused on student teachers in a variety of program areas rather than exclusively focusing on the special education and general education teaching pair. We examined the co-teaching model through student teachers enrolled in three program areas. Additionally, this data is self-reported data which was not independently verified. Self-reported data has some negative aspects including participants having selective memory or exaggeration.

Future Research

The purpose of this study was to gain insight on how co-teaching strategies could be more effectively implemented in student teaching, P-12 classrooms, teacher preparation programs, and first year teacher internship programs. Maintaining the study's purpose, future research could focus on utilizing the Pilot Study's eight co-teaching strategies. This instrument identified the level of time student teachers are teaching alone and assisting to obtain a clear sense of student teachers' actions in the clinical experience. This concentration may inspire researchers to evaluate the strategies in and among themselves that is to examine exactly how the strategies are implemented in ways to differentiate instruction and assessment and better meet student learning needs.

Building on this study, additional research may be done exploring the reasons for the increase in the *Assist* strategy for MGE student teachers. This could help identify ways to support student teachers as a move to more sophisticated co-teaching strategies.

Additionally, future research can investigate ways the co-teachings strategies are implemented in the teacher education programs using developmentally appropriate practices prior to student teaching. For example, early learners enrolled in introductory education courses could begin with Stobaugh and Gichuru's (2016) *Student Teacher Observes* and S*tudent Teacher Assists* strategies.

Moreover, university faculty may consider a heavier emphasis on the *Team Teaching* co-teaching strategy in the undergraduate teacher education clinical experiences to better prepare teacher candidates for the use of the strategy throughout the student teaching semester. The cooperating teachers may benefit from specific training on the *Team Teaching* strategy to promote a positive transformation of the student teaching experience. Researchers could collect data prior to and following the trainings to capture the value and impact of a *Team Teaching* inclusion in the student teaching process.

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Figure 1. Pilot Student Teacher Survey

WKU Co-teaching Mid-point Checkpoint *Student Teacher Form*

Student Teacher's Name:	School Name:	Level: (Preschool, ELE, MS, HS)
How many hours a week do you co-plan with your teacher? Circle the number of hours below.		

1 hour	2 hours	3 hours	4 hours	5 hours	6 or more hours

What percentage   of the time are you engaged in each of the co-teaching strategies? Make sure   your total amount of time equals 100%.For example, 50% Team Teaching and 50% Alternative (50 + 50 = 100).

Student Teacher Teaches Alone (Solo Teaching)	0	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Student Teacher Observes	0	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Student Teacher Assists	0	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Station Teaching	0	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Parallel Teaching	0	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Supplemental	0	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Alternative	0	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Team Teaching	0	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Co-Teaching Strategies

Student Teacher   Teaches Alone (Solo Teaching)– The Student Teacher has the primary   instructional responsibility while the Cooperating Teacher gathers specific   observational information.(One Teach,   One Observe)

Student Teacher   Observes-The Cooperating Teacher is the primary teacher while the Student   Teacher gathers specific observational information.(One Teach, One Observe)

Student Teacher   Assists– The Cooperating Teacher has primary instructional   responsibility of leading instruction while the Student Teacher assists   students' with their work, monitors behaviors, or corrects assignments.(One Teach, One Assist)

Station Teaching– The Cooperating Teacher and Student Teacher divide the   instructional content into parts. Each teacher instructs one of the groups,   then the groups rotate.

Parallel Teaching–The Cooperating Teacher and Student Teacher instruct half the students.The two teachers are addressing the same instructional material and presenting the material using the same teaching   strategies.

Supplemental–The Cooperating Teacher and Student Teacher   plan and implement a task/activity where one teacher works with students at   their expected grade level, while the other teacher works with those students   who need the information and/or materials extended or remediated.

Alternative–The Cooperating Teacher and Student Teacher   plan and implement two different approaches to teaching the same information.The learning outcome is   the same for all students however the avenue for getting there is different.

Team Teaching–Well planned,   team taught lessons, exhibit an invisible flow of instruction with no   prescribed division of authority between the Cooperating Teacher and Student   Teacher.Using a team teaching   strategy, both teachers are actively involved in the lesson.From a students' perspective, there is no   clearly defined leader – as both teachers share the instruction, are free to   interject information, and available to assist students and answer questions.

Figure 2. Student Teacher Survey

Co-Teaching Models

- *One Teach, One Observe*: One teacher has the primary responsibility while the other gathers specific observational information on students or the instructing teacher. The key to this strategy is to have a focus for observation.
- *One Teach, One Assist*: One teacher has primary instructional responsibility, while the other assists students with their work, monitors behaviors, or corrects assignments.
- *Station Teaching*: The co-teaching pair divides the instructional content into parts and the students into groups. Groups spend a designated amount of time at each station.
- *Parallel Teaching*: Each teacher instructs half the students, addressing the same instructional materials and presents the material using the same teaching strategy.
- *Supplemental Teaching*: One teacher works with students at their expected grade level while the other teacher works with those students who need the information and/or materials re-taught, extended, or remediated.
- *·lternative or Differentiated Teaching*: Provides students with different approaches to learning the same information.
- *Team Teaching*: Well-planned, team-taught lessons with no prescribed division of authority.

Question 1: To what extent were you were exposed to the co-teaching models during your coursework and field experiences **prior to** student teaching experience?

	Extensive exposure	Moderate exposure	Minimal exposure	None at all
	Very comfortable with the model and my ability to use it during student teaching	Somewhat comfortable with the model and was ready to use it during student teaching	Not Comfortable with the model and would not use it during student teaching	Limited or no exposure to the model
One Teach, One Observe	4	3	2	1
One Teach, One Assist	4	3	2	1
Station Teaching	4	3	2	1
Parallel Teaching	4	3	2	1
Supplemental Teaching	4	3	2	1
Alternative or Differentiated Teaching	4	3	2	1
Team Teaching	4	3	2	1

Question 2: To what extent were exposed to the co-teaching models **during** your student teaching experience?

	Extensive exposure	Moderate exposure	Minimal exposure	None at all
	Very comfortable with the model and successfully used it during student teaching	Somewhat comfortable with the model and tried to use it during student teaching	Not Comfortable with the model and did not use it during student teaching	Limited or no exposure to the model
One Teach, One Observe	4	3	2	1
One Teach, One Assist	4	3	2	1
Station Teaching	4	3	2	1
Parallel Teaching	4	3	2	1
Supplemental Teaching	4	3	2	1
Alternative or Differentiated Teaching	4	3	2	1
Team Teaching	4	3	2	1