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Research paper

Effective teaching strategies: Pre-service teachers' experiences in team taught courses in an interdisciplinary Early Childhood teacher education program☆

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HIGHLIGHTS

- Quantitative and qualitative results provide pre-service teachers' perspectives of team teaching.
- Team teaching provides pre-service teachers with differing perspectives that enhance learning.
- Team teaching models effective collaboration between two differing specialists.
- Team teaching provides a good role model for pre-service teachers' future teaching careers.
- Team teaching that includes families of children with disabilities is impactful.

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ABSTRACT

Teacher preparation programs support the development of effective early childhood (EC) teachers through multiple methods. Team teaching is one approach that may facilitate students' learning and understanding. The current study collected data from 55 pre-service teachers to examine their perspectives on their experiences in team taught courses in an interdisciplinary EC program. A qualitative and quantitative approach was used to analyze survey items so that data from both close-ended and open-ended questions contribute to the findings about practices being modeled and benefits and challenges in team taught classes. Strategies to support this instructional approach in teacher preparation programs are discussed.

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Early childhood (EC) teacher preparation programs are charged with providing opportunities that support preservice teachers to work collaboratively in their classrooms and programs to address the learning and development of each and every young child and engage families in the learning process. Effective teaching practices in EC education for children with and without disabilities requires highly qualified teachers who know how to collaborate, and communicate and work with families and other professionals, yet very few teacher preparation programs provide academic and application-based opportunities for pre-service teachers to observe and engage in collaborative interdisciplinary practices across early childhood (EC) and early childhood special education (ECSE; Blanton et al., 2018; Bricker & Bohjanen, 2018). Given differences in state licensure, requirements and endorsements, relatively few institutions of higher education have EC/ECSE teacher preparation programs that span across departments and/or schools, yet, recommended practices and inclusion efforts suggest utility in collaborative programs (Mickelson et al., 2022; Stayton, 2015). Effective team teaching has the potential to provide pre-service teachers with different expertise, a model of collaboration, and

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interdisciplinary programs can implement this approach into their curriculum as an effective teaching model (Letterman & Dugan, 2004).

1. Team teaching defined

Simply defined, team teaching in higher education consists of two instructors teaching students enrolled in one course. The faculty members can be from the same, or differing disciplines, and collaborate in varying degrees to provide instruction (Baeten & Simons, 2014). In their review of the literature related to co-teaching, Baeten and Simons (2014) presented two differing modes of co-teaching, "the equal status model," and "the team model" (p. 94–95). When teaching in an equal status model, instructors often divide and share the teaching load. In the team model, the instructors engage in complete collaboration to plan, deliver, and evaluate the course. The instructors are very interactive when delivering content, e.g., they are both presenting to the class at the same time, while bouncing ideas off one another. In the current paper, the term team teaching is used to describe the model used.

1.1. Benefits of team teaching

Team teaching researchers have been calling for more comprehensive studies that incorporate the views of participants in the team taught classroom (Gladman, 2015) and best practice in adult teaching suggests students' insight should be considered in the decision-making process and when designing teaching strategies to improve their learning (Schmulian & Coetzee, 2019). Although instructors and administrators may hold individual views of team teaching that are important, including students' perceptions about team teaching is valuable because they are the key participants and they experience the primary impact of this teaching model (Schmulian & Coetzee, 2019).

Students have reported that team teaching facilitates their learning and understanding of the class content (Gladman, 2015; Graziano & Navarrete, 2012). In Gladman's (2015) study they investigated students' perspectives ($n = 32$) about a collaborative interdisciplinary team teaching model that included an instructor in Teaching English as a Second or Other Language (TESOL) and an instructor from the academic subject of the class. The results from surveys revealed that students reported that team teaching improved their understanding of class content, promoted their willingness to ask more questions, and increased participation and interaction between students and teachers (Gladman, 2015). Similarly, Graziano and Navarrete (2012) reported positive student experiences. In their study of the experiences of 18 students in a team taught education course, each instructor carried an equal position in the course. In their team teaching course evaluation, a student stated, "With co-teaching, one can say something and the other rephrases it and this helps with understanding content" (Graziano & Navarrete, 2012, p. 122). Another example of how team teaching can facilitate pre-service teachers' learning is reported in Williams et al. (2010). The researchers examined the perspectives of pre-service teachers in relation to an online team taught course in special education. Student feedback from a survey ($n = 30$), showed that students considered team teaching an effective strategy to support their learning, receiving feedback on assignments, and getting quick responses from the instructors.

Research has indicated interdisciplinary collaborations through team teaching also can provide a model of effective collaboration practice for students (Crow & Smith, 2003; Ferguson & Wilson, 2011). In other words, students see their interdisciplinary instructors working together to deliver course instruction. This effective interdisciplinary collaboration is modeled for the students to lay a foundation for students to implement in their future careers. To illustrate this, Crow and Smith (2003) examined a team taught course delivered by interdisciplinary instructors across fields of health care and social work. At the end of the study, students expressed that team teaching provided an example of what they were learning and it showed that effective collaboration was possible with each other and the group in general.

2. Early Childhood teacher preparation

North Carolina was one of the first states to offer a blended certification in EC and ECSE through the Birth through Kindergarten (B–K) licensure. In contrast to an EC certification, which prepares pre-service teachers to work in early childhood programs, the B–K license also prepares pre-service teachers to teach in public or private kindergarten classrooms that enroll children with and without disabilities (Mickelson et al., 2022). Although there is no data on the number of universities that use an interdisciplinary approach in their EC teacher preparation programs, recent activity reported by the Early Childhood Personnel Center (ECPC) suggests an increase in interest in universities implementing an interdisciplinary approach (ECPC, 2020). Even with this increased interest, there is still a limited amount of empirical evidence that support interdisciplinary models or the impact they have on pre-service teachers (Brownell et al., 2011; Pugach et al., 2014). However, findings from the limited studies are encouraging for the development of interdisciplinary EC/ECSE programs and suggest these programs support learning and application of effective EC teacher practices (Barton & Smith, 2015; Miller & Stayton, 2006; Silverman et al., 2010).

Early childhood teacher preparation programs should provide opportunities that support preservice teachers to work collaboratively in their classrooms and programs to address the learning and development of each and every young child and their families. Hence, it is important that preservice teachers have opportunities to "observe and internalize the necessity and effectiveness of collaboration" and communicate with families and among professionals during their teacher preparation program (Hestenes et al., 2009, p. 174; Letterman & Dugan, 2004). One method to provide pre-service teachers with a real world understanding of multiple and diverse perspectives as well as modeling of collaboration is through interdisciplinary EC and ECSE teacher preparation programs is team teaching. As the focus on alignment of standards and blended ECSE and EC programs re-emerges, addressing the team teaching component of an interdisciplinary program is timely (ECPC, 2020).

2.1. Importance of collaboration in EC teacher preparation

In the United States, standards for personnel development have been developed by leading organizations for EC (i.e., the National Association for the Education of Young Children [NAEYC], 2020), and the leading organization for early intervention (EI) and ECSE (i.e., the Division for Early Childhood [DEC], 2020). The standards in each organization's competencies are based on developmentally appropriate practices and support each other. The standards support the need for professional communication skills between colleagues and families to support a young child's learning. EC and EI/ECSE educators who acquire effective communication skills are prepared to understand developmentally appropriate practice and effectively communicate the needs of a child based on those practices to families and other EC professionals. The standards support the importance of an EC professional to engage in continuous, collaborative efforts to inform their practice and apply that

model of collaboration into their classrooms and work with families and other EC professionals (Division for Early Childhood [DEC], 2020; NAEYC, 2020). Pre-service teachers can acquire those skills by participating in continuous collaborative learning opportunities such as team taught courses (NAEYC, 2020).

EC teacher preparation programs can address the standards focused on collaboration among differing professionals by modeling the ability to support and engage others through respectful, reciprocal relationships (NAEYC, 2020). Instructors in a team taught course are able to each bring their different perspectives into the course and model how to share those perspectives in a respectful, collaborative manner (Chiasson et al., 2006; Hestenes et al., 2009). Pre-Service teachers in team taught courses are able to participate in a course where two instructors are implementing different, effective teaching strategies, share their different perspectives and expertise on curriculum topics and be models for communication and collaboration. All of these practices can be modeled into pre-service teachers' future work as they communicate and collaborate with other early childhood professionals and families (NAEYC, 2020).

2.2. Theoretical framework for team teaching in EC teacher preparation

Team teaching in EC teacher preparation programs closely aligns with Lev Vygotsky's theoretical framework of the Zones of Proximal Development with a specific focus on building upon pre-service teachers' prior knowledge through modeling collaboration in an interdisciplinary program (Loyens et al., 2007). Vygotsky explains the Zones of Proximal Development as the distance between a person's actual developmental level that is determined by independent problem solving and their level of potential development that can be enhanced through problem solving under the guidance of their instructor through teaching and modeling (Vygotsky, 1978). Team teaching in an interdisciplinary program provides pre-service teachers the opportunity to see a model of effective collaboration between faculty from two different departments or schools working together to meet the needs of the students in their classroom. Pre-service teachers in team taught courses are provided with the opportunity to learn and interact with instructors who may have different teaching methods, varying perspectives on the curriculum, and expertise in different areas. Pre-service teachers are provided the opportunity to participate in dialogue, collaborate with both instructors, and build their knowledge base in communicating and collaborating across differing perspectives (Walsh & Elmslie, 2005).

3. Research on team teaching in EC and ECSE teacher preparation

While team teaching has been implemented in higher education for some time, research on team taught courses in EC and ECSE teacher preparation programs has received limited attention (Hestenes et al., 2009). Furthermore, instructors from different disciplines team teaching has received far less attention. The intended learning benefits for pre-service teachers in these fields warrant investigation of their perspectives of the team teaching in courses and further understanding of what and how they are learning. The few studies available focused on team teaching in EC/ECSE have reported positive findings including student learning from different perspectives and instructors collaborating to model different instructional methods (Chiasson et al., 2006; Hestenes et al., 2009). The Chiasson et al. (2006) study was one of the first studies to describe a team teaching model to support pre-service teachers' understanding of special education and including all children in early education. Although the focus was primarily on the instructors' experiences, reports from pre-service teachers indicated that having two instructors increased their understanding of the range of the course content. In another study of pre-service teachers enrolled in three different team taught courses in an interdisciplinary EC teacher preparation program, pre-service teachers reported that in addition to feedback being provided more quickly, having two instructors providing feedback allowed the pre-service teachers to learn from multiple perspectives (Hestenes et al., 2009). Pre-service teachers also mentioned that having two instructors made the course more interesting and instructors were able to "cover subject matter more thoroughly and in more detail" (p. 180).

3.1. Facilitates pre-service teachers' exposure to effective EC and ECSE teaching strategies

Pre-service teachers who complete interdisciplinary team taught courses have the potential to experience multiple perspectives from different disciplines of study which can lead to facilitated learning outcomes (Chiasson et al., 2006; Sandholtz, 2000). Chisasson and colleagues (2006) used a formative assessment tool comprised of open-ended questions to collect student feedback on their experiences in an interdisciplinary team taught course. During Chiasson and colleagues' (2006) reflection of an interdisciplinary team taught EC and ECSE course, they stated that many of the pre-service teachers enrolled were likely not going to be "special education teachers, but may encounter a child with disabilities in their classroom" (p. 311). In the open-ended questionnaire, the students in the course reflected that learning from the ECSE and EC professors was beneficial because they bring different perspectives to the course, and the instructors provided "realistic ideas" (p. 310).

Further, teacher preparation research recommends that pre-service teachers experience the interdisciplinary, team taught model to prepare them to work collaboratively to support and meet the learning and development needs of all children in the classroom (Gladman, 2015; Kloo & Zigmond, 2008). Team teaching can help pre-service teachers experience the advantages and challenges of collaborative work (Ferguson & Wilson, 2011).

These studies underscore the benefits and potential of team taught courses. The current study serves to build the literature base on team teaching and focus on what teaching strategies early childhood pre-service teachers may learn through an interdisciplinary team teaching approach. The following research questions guided the current study: (1) What teaching practices do students report being modeled and helpful in team taught courses, and (2) From a student perspective, what are additional benefits and the challenges in courses that are team taught?

4. Method

Pre-service teachers enrolled in team taught courses completed a survey to explore their perspectives related to team teaching in our interdisciplinary EC/ECSE teacher preparation program and learning specific to supporting understanding of multiple and diverse perspectives as well as modeling collaboration. We used both quantitative and qualitative methods to examine the responses to the close- and open-ended survey items. Prior to completing this research, the university's institutional review board (IRB) approved the IRB application to survey the pre-service teachers enrolled in the university's EC program.

4.1. The Early Childhood interdisciplinary teacher preparation program

The program is co-administered by two separate schools and within these schools, the departments of Human Development and Family Studies (HDFS, within the School of Health and Human Sciences) and Specialized Education Services (SES, within the School of Education). The undergraduate EC program offers foundation courses, practicum courses, methods courses, and capstone teaching classes; seven of these courses are team taught courses in the areas of assessment, social-emotional learning, curriculum methods across birth through kindergarten, family-school partnerships, and diversity. Six of the seven courses are team taught, with one instructor from HDFS and one instructor from SES teaching the course together. One course is a team taught with an instructor from SES and a parent who has a child with a disability. The course instructors are either full time faculty or adjunct faculty and the program also includes doctoral level graduate students in the team teaching process for the purpose of training future academic professionals. For all the team taught courses, except for the parent course, the teaching team works together in all aspects of the course including planning, instructions, presenting materials, and grading (aligning with "the team model" of team teaching described in Baeten & Simons [2014]). In the parent team taught course, the instructor of record takes on the majority of the teaching responsibilities (e.g., planning, instructions, and most grading), and the parent supplements the learning materials by adding feedback when grading and presenting the materials with the instructor. The parent adds their perspective and experiences to the course material; thus, playing a more complimentary or supportive role (Al-Saaideh, 2010), as opposed to a full teaching role. We thought it was important to examine the pre-service teachers' perceptions of all of our team taught courses to better understand which teaching practices they found the most impactful.

Pre-service teachers in the EC program are enrolled in one of the two program types: online degree completion or traditional main campus program. We have an approximate enrollment of 400 pre-service teachers in the program with the majority (75%) of pre-service teachers enrolled in the online program. The online courses are delivered either synchronously or asynchronously. The program has two concentrations: Early Care and Education (ECE) or Birth to Kindergarten (BK). The ECE concentration prepares individuals for careers in agencies and community child care programs serving children and families. The BK concentration prepares pre-service teachers to be eligible for a North Carolina teaching license to teach young children from birth through kindergarten. Individuals in the ECE and BK concentrations take all the same team taught courses, except for a team taught course focused on kindergarten curriculum methods that only pre-service teachers in the BK licensure concentration complete.

4.2. Research team

The research team included faculty from HDFS and SES who had prior experiences team teaching, advanced doctoral pre-service teachers in HDFS and SES and an undergraduate research assistant. Each member participated in a number of tasks and for most tasks a member from HDFS and a member from SES was represented. At the time of data collection, one faculty member on the research team was teaching a team taught class. Our research team holds the epistemological belief that pre-service EC educators learn best when provided a model of experiences they are likely to encounter when teaching children (Walsh & Elmslie, 2005). Thus, we engage in team teaching to provide our pre-service teachers with a model of interdisciplinary professionals working together collaboratively to meet the needs of the students they teach (similar to recommendations from Gladman, 2015; Kloo & Zigmond, 2008; Loyens et al., 2007). To help ensure that our positionality did not have an effect on the study, we relied on consensus building and the importance of understanding multiple viewpoints to arrive at judgments about the meaning of the data (Creswell & Creswell, 2018; Hill et al., 2005). Further, we engaged in reflexive journaling to address biases and assumptions (Linneberg & Korsgaard, 2019).

4.3. Participants

During the Fall 2019 semester, instructors teaching a team taught undergraduate course sent out a Quatrics survey to pre-service teachers enrolled in their class. During the Fall 2019 semester six of the seven courses were taught (many with multiple sections). Thus, there were a total of 11 team taught courses taught in that semester ($N = 311$ pre-service teachers). Pre-service teachers who consented to have their responses included as part of the study were included in this study. Eighty pre-service teachers responded to the survey and consented to allow their responses to be used in our research study. However, many did not complete the survey in full. Thus, after removing the missing data, responses from 55 pre-service teachers were included in data analysis. Pre-service teachers ($N = 33$) who were enrolled in more than one team taught course in Fall of 2019 completed the survey one time so that responses represent unique individuals.

4.4. Measure

The Qualtrics survey, modeled after the survey used in the Hestenes et al. (2009) study, consisted of three parts with a total of 23 questions and took 15–20 min to complete. The first part of the survey included six multiple-choice questions related to pre-service teachers' experiences specific to the program (e.g., name, program concentration [ECE or BK], program type [online or main campus], current class enrolled, and the number and name of the team taught courses completed). We did not collect demographic information about age, gender, race, or ethnicity. The pre-service teachers' names and current course were collected to report to instructors of the course for extra credit opportunities (see "Survey Distribution Procedures" for a full description). They were also collected in an effort to ensure pre-service teachers did not take the survey twice and if they did, duplicate responses were removed.

In the second part of the survey there were nine items. For eight items, pre-service teachers used a 5-point Likert-type scale from 'strongly agree' to 'strongly disagree' to various aspects of their experience in team taught courses. These eight items were related to effective teaching practices related to team teaching ($n = 1$ items: "It is clear from course lectures, grading, emails, etc that instructors work closely together."), better learning outcomes ($n = 2$, e.g., "When compared to traditional courses that have one instructor, team-taught courses facilitate a clearer understanding of the course content."), negative aspects ($n = 2$, e.g., "Instructors often express opposite opinions and this leads to confusion"), and modeling EC best practices ($n = 3$, e.g., "Team teaching provides me the opportunity to learn from different perspectives."). Pre-service teachers were also asked to report their overall satisfaction with the team taught courses in the program by using a 5-point Likert-type scale from 'very satisfied' to 'very unsatisfied'. A full list of these nine items are included in Table 1.

The third part of the survey consisted of six open-ended questions. The first three questions of the survey required responses. These questions asked pre-service teachers to reflect on a certain course that was helpful or not (e.g., "Are there certain courses that

Table 1
Means from Survey by Research Questions (in bold) and Categories.

Category	Survey Questions	Means
Teaching Practices Modeled		
Quality Team Teaching	It is clear from course lectures, grading, emails etc. that instructors work closely together.	4.2
Modeling Early Childhood Quality Practices	Team teaching provides me the opportunity to learn from different perspectives.	4.1
	When faculty teach they are modeling early childhood, and early childhood special education inclusion.	4.4
	When faculty team teach they are modeling collaboration and effective communication	4.3
Additional Benefits and Challenges		
Better Learning Outcomes	Team teaching facilitates my learning.	3.8
	When compared to traditional courses that have one instructor, team-taught courses facilitate a clearer understanding of the course content.	4.0
Negative Aspects	Instructors often express opposite opinions and this leads to confusion.	2.0
	The instructors grade assignments differently.	2.6

the team-teaching process was very helpful [not helpful]? If so, please provide a specific example:"), and discuss their perspective on the parent co-taught course ("If you are currently taking or have taken a parent co-taught course, how has your perspectives related to working with families changed after being in the course taught by the parent co-instructor?"). The last three questions were optional. These questions focused on any additional benefits or challenges the student wanted to share regarding team taught classes and reflection on how team teaching could inform their future career ("How does team teaching inform your future career?").

4.5. Survey Distribution Procedures

The distribution of the survey was semi-structured. First, we spoke about the survey in a EC faculty meeting to gain program approval, then we contacted the instructors who were teaching a team taught course to provide them a description of the study and the research aims. We asked the instructors to distribute the link to the survey with a pre-written email which provided a rationale for the study to the pre-service teachers enrolled in their courses. Pre-service teachers were also asked for their consent to use their responses for research purposes. If they did not consent, their responses to the survey were used for program evaluation and development only, and their responses were not included in this study.

Pre-service teachers who completed the survey were entered into a raffle to receive a one-year subscription to an EC practitioner-friendly journal. Other incentives were provided to some pre-service teachers depending on the instructors' preference (e.g., some instructors provided extra credit for completion). All pre-service teachers' identifying information and corresponding survey answers were kept anonymous from the instructors and the research team responsible for analyzing the data. One research assistant collected the names from the survey for incentive purposes only and reported these to the course instructors. All data was de-identified by the research assistant prior to analyzing the results. Prior to the remaining research team analyzing the results, all data were de-identified.

5. Data analysis procedures

5.1. Coding for program experiences

The quantitative (close-ended items) and qualitative (open-ended items) data were analyzed separately. Prior to analyzing the data, we first coded the program experiences information to explore differences based on the pre-service teachers' team taught experience, program type, and concentration. The program experience information included questions asking pre-service teachers to report how many team taught courses they had taken in the EC program (possible range from 1 to 7 courses). On average pre-service teachers had taken 2 to 3 team taught courses ($x = 2.91$). We categorized pre-service teachers into two categories based on the number of courses they had taken: (1) less experience (1 or 2 courses, $n = 26$ pre-service teachers), or (2) more experience (3 or more courses, $n = 29$ pre-service teachers). Pre-service teachers reported what program they were enrolled in: online degree completion ($n = 48$) or main campus programs ($n = 7$). Pre-service teachers also reported what concentration they were seeking: BK licensure ($n = 36$), or ECE non-licensure ($n = 19$).

5.2. Quantitative analysis

Preliminary analyses on the quantitative survey questions showed the item responses were within the expected ranges for the Likert-scales and were within normal limits based upon examination of the *p*-plots and *q*-plots. Means were utilized to determine level of agreement or disagreement for the majority of the questions and overall satisfaction for the satisfaction question. Descriptive data are provided for each of the survey questions (See Table 1). After we re-coded the negatively worded questions, we averaged the eight items related to effective teaching practices, better learning outcomes, negative aspects, and modeling EC best practices to determine the overall total since the satisfaction question was computed on a different scale ('overall satisfaction' as opposed to 'level of agreement'). We used the overall total of the eight items to compute differences between groups based on the pre-service teachers' program experiences. We computed *t*-tests to examine differences in pre-service teachers' experience with team taught classes, major (BK or ECE), and program type (main campus or online).

5.3. Qualitative analysis

Prior to analyzing the results for the six open-ended questions, we removed the non-substantial quotes (e.g., "N/A," or "No additional benefits"). To analyze the qualitative data, the researchers first transferred the data into an excel document. Using the "Sort and Sift" method discussed in Maietta (2006) to guide the analysis, we began by reading participants' responses and writing memos based on each participant. To ensure we were consistent, we first read through five randomly-selected open-ended questions and wrote research memos. After the initial five responses were analyzed independently, we discussed the findings and copied the quotes into an excel sheet based on the survey questions and similar categories that were emerging in the data. We began to cluster the quotes into categories when they were similar in

content, developing categories using the participants' words in as many cases as possible (Linneberg & Korsgaard, 2019). We individually highlighted interesting quotes and wrote a short memo stating why they were interesting. We built consensus prior to generating the code book based on the random five participants, we then independently analyzed 19 more participants and conferred afterward. After discussing the analysis for the first 24 participants, we noticed 29 similar categories, and wrote an "early analysis findings" memo (Linneberg & Korsgaard, 2019; Maietta, 2006).

After analyzing 24 out of 55 participants, we found that many categories had 1 or 2 quotes listed; thus, we began to collapse these categories into themes. For example: "Class Helpful-learning from different perspectives: parent/instructor" and "Class Helpful-learning from different perspectives: instructor/instructor" were collapsed to: "Helpful- Two Perspectives" to describe the participants' quotes that spoke about how their instructors (regardless of position, i.e., instructor or parent instructor) were helpful because it provided the pre-service teachers an opportunity to learn from two differing perspectives. We continued to combine categories into themes and subthemes using this reiterative process (Linneberg & Korsgaard, 2019). Overall, we coded 16 of 55 (29.1%) participants' open ended questions together to build consensus (Hill et al., 2005). Thus, we coded 39 of 55 (70.9%) responses individually. To protect the instructors' privacy, specific courses mentioned by participants are not presented in the results. The only exception to this is the discussion of the parent team taught course since the researchers specifically asked pre-service teachers about this course. To explore the differences in themes and subthemes between the program experiences (program type, concentration, and experience), we simply completed a frequency count and percentages of responses to determine how many responses were in each category (e.g., how many online pre-service teachers described benefits of team teaching compared to how many main campus pre-service teachers described benefits of team teaching).

6. Findings

Findings are presented for each research question integrating quantitative and qualitative and data. Data focused on teaching practices modeled are followed by data centered on benefits and challenges. Overall, pre-service teachers rated their satisfaction with team teaching courses in the EC program between somewhat satisfied (4) to very satisfied (5 [$M = 4.2$, $SD = 1$]).

6.1. Teaching practices modeled

Responses from the close-ended survey questions (see Table 1) indicated that pre-service teachers agreed that instructors worked closely together based on experiences through lectures, grading, and emails ($M = 4.2$, $SD = 1.1$). On the three questions related to whether team taught courses modeled EC effective teaching practices, pre-service teachers reported that team teaching provided them with the opportunity to learn from different perspectives ($M = 4.1$, $SD = 1.0$), that faculty modeled collaboration and effective communication ($M = 4.3$, $SD = 0.8$), and that team teaching was a good model for EC and ECSE inclusion ($M = 4.4$, $SD = 0.7$). In relation to the open-ended survey questions, the following themes emerged related to teaching practices modeled in the team taught courses (see Table 2).

6.1.1. Courses helpful

Twenty-four pre-service teachers responded that a specific class was helpful. Of the 24 participants that listed a specific course, 11 of these participants (46%) listed the parent co-taught course as helpful. Since there was a survey question that was specifically related to the parent co-taught course, we will report the results based on this course under the parent class perspectives theme. Thus, the following information is based on the remaining 13 participants' quotes. Of the 11 respondents, three participants stated that all courses were helpful.

Table 2
Themes and Sub-Themes by Research Question (in bold) in the Open-Ended Items.

Themes	Sub-themes
Teaching Practices Modeled	
Course helpful ($N = 24$)	Cohesive ($N = 5$)
	Two perspectives ($N = 6$)
Parent class perspectives ($N = 23$)	Real-life example ($N = 13$)
	Better understanding ($N = 10$)
Inform teaching ($N = 40$)	Demonstrated a good role model ($N = 33$)
	Better knowledge ($N = 7$)
Additional Benefits	
Benefits ($N = 33$)	Quicker responses ($N = 13$)
	Different viewpoints ($N = 20$)
	More engaging ($N = 6$)
Additional Challenges	
Course not helpful ($N = 6$)	Hard to follow information ($N = 1$)
Challenges ($N = 23$)	Communication ($N = 11$)
	Grading ($N = 14$)
Not much different ($N = 9$)	

There were two sub-themes that emerged from the themes of 'course helpful' and they relate to effective team teaching practices that the instructors modeled in their course: **cohesive** and **two perspectives**. To illustrate the **cohesive** sub-theme, one participant stated: "The professors were cohesive with one another. They worked very well together. They were also an exceptional team." Four other participants said something very similar, e.g., "They [instructors] worked together to provide information to online students."

Six participants wrote about the importance of having two instructors because they gained **two perspectives**. For example, one student stated: "[A course] was team taught and it was very helpful hearing two perspectives on certain topics especially pertaining to inclusion." Another student stated that the multiple perspectives allowed the instructors to bounce off each other, e.g. "When one was lacking or in a bind the other would pick right and move along with the course."

6.1.2. Parent class perspectives

Twenty-three pre-service teachers reported that they took the parent team taught course, e.g., the course in which a parent who had a child with a disability served in the supportive role. The majority of the pre-service teachers (18 of 23) responded that their perspectives had changed after taking the course, and the instructor and parent instructor modeled effective team teaching practices, i.e., the course provided a **real-life example** and **better understanding**. To summarize the **real-life example** sub-theme, one participant stated: "It gave me a better perspective of having a real-life parent who is/has gone through some of the things we talked about. She helped to give realism to the material that helped me to learn it better." Twelve other participants said something very similar, stating that the parent class allowed them to see a different perspective. For example, a student stated: "I looked at things quite differently. It really gave me another way to look at parents that have children with disabilities." While another student stated, "I enjoyed getting the perspective from a parent who deals with this on a daily basis."

There were 10 student quotes that discussed that the parent team taught class provided a **better understanding.** In fact, three pre-service teachers used this exact phrase "better understanding."

For example, “I did get a better understanding of what it's like for the families. It was very insightful!” One student stated that they have a better understanding of not just the parent perspective, but many different aspects of the family's life, e.g., “I developed a better understanding as far as the process parents go through with the schools, teachers and even doctors.” Practically, one student spoke about how the class helps in her current/future career. She stated: “It really gave me more insight into what parents and families go through and how to better support them in my own practice. It showed me that I must advocate and self-reflect on every chance that I get.”

6.1.3. Inform future teaching career

Another theme that emerged from the data was that for most of the pre-service teachers (40 of 55), the university's team teaching model informed their future teaching career in a positive way. There was only one negative response to this survey item in which the student stated, “I would never want to be a team teacher”. The two sub-themes that pointed to the positive aspects were: **demonstrated a good role model** ($N = 33$) and **better knowledge** ($N = 7$).

Pre-service teachers viewed that team teaching **demonstrated a good role model** that they would need to use in their future teaching careers, e.g., “It provided me a good role model on how we can work as a team, and provide different points of view when working with children.” Another student added that team teaching in the university's program was “modeling for myself and others, as aspiring educators, what collaboration between educators can and should look like.” Many pre-service teachers commented that the collaboration that was demonstrated provided them a good model. “The way they model communication between themselves … how they can just vibe off each other in a way that I hope to be able to work like that with my co teacher.” One student took it further by stating that, “In this field of work we are expected to collaborate with others and this format of teaching takes it from just being a concept to real life experience.”

In terms of **gaining better knowledge**, one student mentioned that team teaching “provides different perspectives and enhances your knowledge concerning your career…It provides me with a variety of learning experiences through each of the instructors' experience and teaching.” While another concluded that, “It provides me with knowledge on how to become a better professional in the future while working with different families.”

7. Benefits

Additional benefits included the student's report related to the two survey items focused on better learning outcomes, pre-service teachers reported that team teaching facilitated a clearer understanding of the course content ($M = 3.9$, $SD = 1.1$) and they viewed team teaching as facilitating their learning ($M = 3.8$, $SD = 1.2$). Further, pre-service teachers reported low scores on the negatively worded survey item, i.e., they disagreed that instructors in team taught courses held opposite opinions or that those opinions led to confusion ($M = 2.0$, $SD = 1.1$).

On the open-ended survey questions, 33 pre-service teachers reported on the additional benefits of team teaching, representing 39 quotes. The sub-themes that emerged are very similar to those discussed in the “course helpful” section: **quicker responses, different viewpoints,** and **more engaging**. Referencing the **quicker responses** sub-theme, 13 pre-service teachers wrote about how team teaching allowed them to receive quick responses to their emails and/or questions, and one student stated that “assignments were graded quickly.” Furthermore, another student stated that “team-teaching allows for more consideration for working adults to have two different instructors in case there's an emergency and a student can't get in touch with one but email both, you are bound to get a quicker response.” One student further stated that “quick responses allow for additional support and guidance from the teachers, in case one of them is not right available.” Another pre-service teachers' quote explained how instructors answered questions in a timely manner and this led to better understanding. She stated: “One benefit would be the way my questions were answered… If I didn't understand the way they were answering the question the other team member would help out so I better understood things.”

Twenty pre-service teachers wrote about the benefit of learning from different perspectives, as illustrated by a student's quote about **different viewpoints** being an additional benefit. One student stated that, “each teacher brings different ideas to the course,” and another stated that “two professors allowed the student to gain different areas of expertise or content area, as well as different experiences from each Professor.” Further, pre-service teachers wrote about why the benefit of learning from different perspectives was beneficial to their learning. In this case, one student stated, “I say this because one professor could have more knowledge on a certain subject and would provide more detail and go more in depth… this would help me understand better and also get information from someone that knows it first hand.”

Six pre-service teachers stated that team teaching was beneficial because it was **more engaging** or it was a better learning experience. This is illustrated in this student's quote: “I believe it is more engaging when the course is team-taught versus just one professor because me personally, feel as though they put out more information for you to grasp.” Another student stated that “team teaching allowed for a better teaching experiences,” while another commented, “Teachers have an awesome relationship which makes the class fun!”

7.1. Challenges

Grading and communication issues were the challenges most reported on both the open-ended and closed-ended survey items. Pre-service teachers reported that they were either “neutral” or “somewhat disagreed” that instructors did not grade assignments differently in team taught courses ($M = 2.6$, $SD = 1$). One of the open-ended survey questions asked about a specific team taught course being helpful or not. Of these respondents, six pre-service teachers stated a specific course was not helpful. Of these six respondents, one pre-service teacher mentioned that the course was not helpful because “it was hard to understand the information.” The other pre-service teachers commented on slow **grading** practices and **communication** issues, i.e., the two sub-themes under the challenges theme in the qualitative data. Twenty-three pre-service teachers spoke about additional challenges related to team teaching, representing 25 quotes related to challenges (this includes the non-duplicate responses in the ‘Classes not Helpful’ theme).

Eleven pre-service teachers reported having **communication** related challenges during a team taught course. Some pre-service teachers stated that the instructors were slow at communicating to pre-service teachers (e.g., answering emails, and/or responding to questions). In one instance, a student noted, “response time was terrible”. Another student further added, “One of my teacher's emails wasn't working so I got responses late at times.” Some pre-service teachers indicated that communication provided to the pre-service teachers differed from one instructor to the other (i.e., the communication between the instructors was not the same). One student noted “It was difficult at times to understand clear expectations from both sides of the team”. Other pre-service teachers

found that communicating with both professors at the same time was difficult, as one pre-service teacher put it "… for students who have never experienced this type of instruction, it can be difficult to remember who to email for what or to add both professors into an email." These challenges with communication seem to have led to confusion, as one student pointed out, "I have experienced a bit of confusion, as it seems there are a lot of mix ups."

Pre-service teachers ($N = 14$) noted that some instructors in the team taught courses were slow at **grading** and providing feedback related to assignments, or that the grading/feedback that was provided differed from one instructor to the other. For instance, one student stated, "each instructor graded differently yet not in a timely manner" while another stated, "grading was delayed in one of my courses … since it was delayed I couldn't use that feedback to correct mistakes in future assignments." Furthermore, another student noted, "This is the biggest stressor I have encountered... I feel that if you are not giving feedback on assignments, how can we know what to work on?"

7.1.1. Not much different

The last theme that emerged from the qualitative data was the notion that a team taught course was **not much different** when compared to a class that was not team taught. On the open-ended survey questions, a small number of pre-service teachers ($N = 8$ pre-service teachers with 9 total responses related) reported this either when writing about a specific team taught class, the parent class, or in reference to how team teaching informed their future career in teaching. One pre-service teacher's quotes illustrate this category well, "It was pretty normal, not much different from the courses I have taken before." The pre-service teacher went on to say, "It doesn't [inform future career]." Another pre-service teacher stated, "I often forgot that there were 2 teachers. I could only tell the difference from the feedback from graded assignments. It didn't hinder my learning, but I don't think it impacted it either."

7.1.2. Program experience comparisons

There were no differences in the responses to the quantitative or qualitative questions based on the program type (online or main campus) or concentration (ECE or BK). Further, quantitative responses in relation to experience with team taught courses did not differ (see Table 3). However, qualitative responses did differ based on experience with team taught courses. Pre-service teachers in the more experience group with more experience in team taught classes reported more often that a class was helpful (17 out of 29, 65.4% of pre-service teachers with more experience, 7 of 26, 26.9% of pre-service teachers with less) or not helpful (6 of 29, 19.4% of pre-service teachers in the more experience group, 1 of 26, 3.6% of pre-service teachers in less experience group). Many pre-service teachers with more experience reported that the parent team taught course was helpful. However, many pre-service teachers with less experience had not yet taken the parent team taught course. If we account for this difference, pre-service teachers with more experience still reported that a class (other than the parent class) was helpful (more: 9 of 29, 31.0%; less: 5 of 26, 19.2%). Pre-service teachers with more experience also responded more often in reference to additional benefits (more: 23 quotes related, less: 16 quotes) and how team teaching informs their current or future careers (more: 25 quotes, less: 15 quotes). Overall, in reference to most survey questions, pre-service teachers with more experience with team teaching reported more often when analyzing the numbers of responses. There was only one exception to this: pre-service teachers, regardless of their experience, responded equally when discussing additional challenges related to team teaching (more: 11 quotes, less: 11 quotes). Overall, the responses from the student surveys provided a positive perspective on team teaching and illustrated strengths of this approach.

8. Discussion

Overall, the pre-service teachers enrolled in the 11 team taught courses in our program during Fall 2019 reported many effective teaching practices were modeled in our team taught courses. They believed the instructors worked closely together and that having two instructors with diverse expertise and experiences helped provide a clearer understanding of the course content when compared to traditional courses with one instructor. Team taught courses were viewed by pre-service teachers as effectively modeling inclusion, collaboration, and communication. Pre-service teachers did not report that instructors in team taught courses held opposite opinions or that their opinions led to confusion. However, pre-service teachers reported that consistent and timely grading practices were a challenge. Further, communicating with both instructors proved to be difficult for some pre-service teachers.

There were no differences in ratings across items based on whether the pre-service teachers were enrolled in the online or main campus program or based on whether they were in the BK licensure or ECE non-licensure concentrations. When exploring the qualitative responses, we do see a difference in reporting for the positive aspects of team teaching based on the number of team taught courses pre-service teachers had taken. Pre-service teachers who had more experience with team teaching in our interdisciplinary EC program tended to write more about the positive aspects of team teaching, i.e., a specific class that was helpful, the benefits of team teaching, and how the team teaching model could inform their future career.

8.1. Continuity in findings

It appears that pre-service teachers' experiences in our EC teacher preparation program have remained relatively consistent with prior data (Hestenes et al., 2009). Of particular interest, pre-service teachers continue to agree at a high rate that team teaching models inclusion. This may be due to pre-service teachers recognizing the importance of inclusion and the need to work directly with a wide range of professionals to meet student learning goals across a broad set of developmental levels. This also may relate to the push for inclusion for young children with disabilities that government agencies have supported in the past decade (see the joint statements of inclusion from the U.S. Department of Health and Human Services & US Department of Education (2015) and the DEC & the NAEYC, (2009)).

Our findings align with the findings in the available literature

Table 3
Quantitative program experience comparison.

Variable	M	SD	*M SD*		*t(53)*	*p*
Type: Online (O), Main campus (M)	O = 4.0	O = .7	M = 4.2	M = .8	.5	.6
Concentration: BK (B), ECE (E)	B = 4.1	B = .6	E = 4.0	E = .8	.4	.7
Experience: Low (L), High (H)	L = 4.0	L = .8	H = 4.1	H = .7	.5	.6

that team teaching in an interdisciplinary program allows pre-service teachers to learn from differing perspectives. These differing perspectives in team teaching can lead to a better learning environment (Chiasson et al., 2016; Sandholtz, 2000). Pre-service teachers reported they were able to understand the content at a deeper level (aligning with the Gladman [2015] study) and team teaching was engaging and fun (Schmulian & Coetzee, 2019). Team teaching models skills pre-service teachers need in their future career as early educators (e.g., collaboration; Ferguson & Wilson, 2011). We also found similar challenges reported around inconsistent and confusing grading and communication policies (Dugan & Letterman, 2008).

8.2. Implications for teacher preparation and research

We found that one of the teaching practices that pre-service teachers spoke very highly of was the approach that the team instructors provided, e.g., the instructors were cohesive and brought different perspectives. Team teaching also provided the pre-service teachers with a positive role model of how to teach in their future careers. In addition, pre-service teachers reported that the model demonstrated in the parent team taught class was extremely helpful because it provided real-life examples of a parent's experiences. In fact, pre-service teachers who had taken this class often wrote about how beneficial it was prior to responding to the specific survey question about the course.

Although we understand that many EC teacher preparation programs may not be able to adopt the team teaching approach described in this paper because of administrative decisions or cost, there are strategies that can be used to provide multiple perspectives and modeling diverse teaching strategies to pre-service teachers. One way to incorporate learning from multiple perspectives could be to invite guest speakers, parents, and other interdisciplinary professionals that often work in EC and early intervention to class sessions so pre-service teachers can hear from their perspectives. Guest speakers and parents can supplement the course materials and serve in a complimentary teaching role (Al-Saaideh, 2010) when pre-service teachers are learning about incorporating and collaborating with different stakeholders (e.g., service providers and families). A collaboration between instructors can present the opportunity for instructors to teach one or more class sessions in another instructor's course schedule. This collaboration can provide an instructor the opportunity to share their expertise in other courses and invite instructors to do the same in their courses. The instructors can use this collaboration as a solo teaching experience or a team teaching experience (Kluth & Straut, 2003). An additional way our course instructors collaborate is to plan course information together if they are teaching different sections of a course. Other teacher preparation programs could also consider this model of collaboration as it provides pre-service teachers the opportunity to still have different perspectives represented in their course.

Future research could explore how pre-service teachers enrolled in differing programs (e.g., online or main campus) or with different experience levels perceive team teaching since we could not find related literature. While we did not find differences in our main campus versus online degree completion programs, we did see differences in our qualitative results when examining responses by experience. We assume that pre-service teachers who have limited experience with team teaching did not report benefits as often because they were new to the approach and did not have a broader perspective on this teaching process. The pre-service teachers with limited experience with team teaching might simply find the model challenging and/or confusing because they are not yet familiar with the structure of communicating with both instructors. For example, a student with limited experience in team teaching (two courses), stated “It was at times confusing”. The student went on to say, “If you wanted to email an instructor you need to include all of them”. We wonder if the pre-service teachers with more experience with team teaching now understand the procedures that the pre-service teachers with limited experience found confusing. Possibly the pre-service teachers with more experience reported more positive aspects because they were able to better navigate the reported challenges. Further, the pre-service teachers with more experience were also more advanced in their education. Thus, they may be more reflective about how they will teach when they graduate; thus, more inclined to see the benefits of team teaching and report positively on their experiences. It would be beneficial for future researchers to examine pre-service teachers' perceptions of team teaching by the level of experience. Professors might then be able to better support pre-service teachers if they understand the pre-service teachers' reported challenges and aspects of team teaching that pre-service teachers find confusing.

Future research could also explore the impact of important team teaching practices on the pre-service/in-service teachers' ability to embed effective teaching practices in their classroom and work with families. Since learning from parents seems to be an important factor in our interdisciplinary program, it would be interesting to learn if it impacted pre-service teachers' ability to apply this knowledge in the “real world”, e.g., in their classrooms. For example, we would like to understand if the experience of learning in an interdisciplinary, team taught program improves EC teachers' ability to communicate with families.

8.3. Limitations

Our study focused on understanding pre-service teachers' experiences in our EC program; thus, the small sample size and low response rate limits generalizing the findings and understanding differing pre-service teachers' perceptions based on differing programs (online or main campus) and the pre-service teachers' level of education or experience with team teaching. Furthermore, it's difficult to determine how representative the responses may be because of the differing incentives offered. For example, some instructors provided extra credit to their pre-service teachers for completing the survey which may have increased participation, and some pre-service teachers were only provided the incentive of the randomly-drawn incentive (i.e., the practitioner-friendly journal subscription). However, since there has been limited research reporting the experiences of pre-service EC teachers enrolled in an interdisciplinary team taught program (Barton & Smith, 2015), our research makes an important contribution to the literature.

When exploring pre-service teachers' perceptions about team teaching in the future, researchers may want to differentiate pre-service teachers' perceptions regarding team teaching versus an overall course evaluation. For example, we sometimes found it difficult to determine if the responses were truly related to team teaching or if they were a general evaluation of the course content or the individual instructor's teaching style: “the course was not helpful because it was hard to understand the information” and “… didn't get questions answered and… feedback to assignments was not available.” Researchers could plan to interview respondents or implement member checking to explore these confusing quotes in more detail.

9. Conclusion

Our findings are consistent and add to the limited research suggesting that team teaching in an EC interdisciplinary program can lead to positive outcomes for student learning (Chiasson et al.,

2006). The pre-service teachers in our program reported that a variety of effective team teaching practices were modeled. Further, the additional benefits and challenges of team taught courses have been consistently reported from our pre-service teachers over the decades of study (Hestenes et al., 2009), and are reported in the literature exploring team teaching in other disciplines (e.g., Crow & Smith, 2003). Given the importance and benefits of the parent team taught course in particular, we can also advocate for incorporating family members in the team teaching model and further exploring the impact of this experience on teacher and family relationships. Research on similar interdisciplinary EC team taught programs is limited, but our long-term findings suggest this approach is worthwhile to pursue. While challenges may be addressed through supporting and training faculty, the team approach can effectively model collaboration across disciplines and provide new levels of engagement in the course content for pre-service teachers with varied perspectives and differing areas of expertise from instructors.

Credit (contributor roles taxonomy) statement

Heather Coleman: Conceptualization, Data Collection and Analysis, Writing, and Editing. **Rachel Boit**: Conceptualization, Data Analysis, Writing, and Editing. **Lisa Butterworth**: Writing and Editing. **Karen La Paro**: Conceptualization, Writing, and Editing. **Tyla Ricks:** Data Analysis and Writing. **Linda Hestenes:** Conceptualization, Data Analysis Supervision, Reviewing, and Editing. **Merve Ozdemir**: Data Organization and Writing. **Aliyah Janeen Aal-Anubia:** Data Organization and Analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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