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STEM Cooperating Teachers' Professional Growth: The Positive Impacts of a Year-Long Clinical Residency Collaboration

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Abstract: Teacher residency programs integrate coursework with clinical practice in a year-long residency in which pre-service teachers work under the guidance of a cooperating teacher who has demonstrated excellence in teaching and mentoring. The purpose of this study was to examine the reasons for serving as a cooperating teacher and investigate how clinical residency pre-service teachers promote growth in the professional practice of cooperating teachers as teachers and teacher leaders. In this longitudinal qualitative study, we gathered data through semi-structured interviews and responses to survey questions over a five-year period. Ten STEM cooperating teachers (six female and four male) with 7 to 18 years of full-time teaching experience in biology, chemistry, or mathematics participated. A thematic analysis was used to analyze the interview transcripts and survey responses. The primary motivation for serving as a cooperating teacher was the desire to share experiences and support new teachers. Cooperating teachers described the following benefits: increased self-reflection and continuing reflective practice; meaningful collaboration with pre-service teachers; learned new teaching strategies to enrich their own teaching practice; improved communication skills; and the impetus to become teacher leaders. These findings support that clinical residency teaching programs are beneficial for STEM cooperating teachers and promote their professional growth.

Keywords: cooperating teacher; teacher educator; pre-service teachers; professional development; benefits to mentors

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1. Introduction

To prepare high-quality teachers for the 21st century, especially in high-need schools, the National Council for Accreditation of Teacher Education Blue Ribbon Panel on Clinical Preparation and Partnerships for Improved Student Learning [1] advocates that teacher education programs center on clinical practice. One of the defining principles of excellent teacher residency programs is the effective integration of education theory and classroom practice in a year-long residency led by an expert teacher [2]. This sustained clinical practice allows pre-service teachers (PSTs) to authentically practice teaching strategies while being supported by effective mentors [3]. Moreover, rich partnerships between schools, districts, and universities are critical to the preparation of high-quality teachers that are retained in the profession [4,5].

Urban teacher residency models integrate coursework with classroom practice in a year-long, co-teaching residency in which a pre-service teacher works under the guidance of a cooperating teacher (CT) in a partnering high-need school district [6] followed by two years of mentoring support [7–9]. A cooperating teacher is a teacher educator who hosts a pre-service teacher in their classroom to provide consistent mentorship by modeling instructional strategies and guiding pre-service teachers as they learn to teach and manage the classroom. The University of Indianapolis clinical residency teacher preparation program [10] was conducted in three urban, high-need districts and included one year of full-time, intensive coursework, theory, and clinical practice, to prepare pre-service teachers

with undergraduate degrees in science, technology, engineering, and mathematics (STEM) for a master of arts in teaching (MAT) and licensure to teach secondary STEM coursework. The education pedagogy and STEM content, based on project-based learning (PBL) [11], were heavily front-loaded, which allowed the pre-service teachers to immediately practice and apply what they were learning in their classrooms. After completing the MAT requirements, program graduates received two years of university-provided mentoring by a content area expert to support them in their initial teaching positions. This support involved regular contact via in-person observations along with workshops and conversations around pedagogy, content, successes, and challenges [12]. The year-long clinical residency also facilitated development of mentor–mentee trust, collaboration skills, and long-lasting relationships, which gave program graduates a jump start into teaching. They performed as second-year teachers during their first year of practice and many program graduates also quickly progressed into leadership roles in their schools and professional societies due to the strength of their preparation [13].

Strong cooperating teachers are critical to teacher education and the success of a teacher preparation program as they support and guide pre-service teachers into the teaching profession [14]. Prior data indicate that effective mentors are fully collaborative, systematically transition control of the classroom to the PST, advocate for personal relationships, and share feedback [15]. They are coaches that intentionally support the ongoing development of a PST [16,17]. Pre-service teachers who learn to teach with instructionally effective cooperating teachers are more instructionally effective themselves [18] and have a higher rate of retention in the profession [19]. In addition, effective CTs are fully engaged with the teacher education process beyond the level of curriculum: providing targeted instructional support and classroom management strategies; integrating PSTs into professional and extracurricular school life; and communicating with school- and university-based program leaders [10].

In the University of Indianapolis program [10], school faculty worked with administrators to identify cooperating teachers who demonstrated teaching excellence in their content area and an ability to effectively mentor a pre-service teacher. The CT oriented the pre-service teacher to the school, provided copies of textbooks and curriculum guides, communicated school policies and emergency procedures, introduced the pre-service teacher to technology and resource personnel, and shared the classroom management plan and established routine. With their support, the pre-service teacher progressed over several months to full responsibility for the classroom, including following individualized education plans, designing student assessments, keeping records, completing forms, and communicating with families. The CT observed lessons and provided frequent formal and informal instructional support and feedback, completed a midterm and final evaluation of the PST, and remained in regular contact with program administrators regarding the pre-service teacher's progress in the program. The positive experience, multiple layers of support, and good communication with program administrators prompted multiple CTs to host subsequent pre-service teachers.

Studies suggest that there are benefits to being a cooperating teacher; for example, as a result of mentoring pre-service teachers, CTs improve their overall collaboration and co-teaching skills [6]. Moreover, through co-teaching, PSTs encourage CTs to revise existing curriculum, collaboratively design new curriculum, and develop new instructional strategies and pedagogical practices [20,21]. Being a CT promotes their own metacognition about their teaching [22] and they are more reflective on their own teaching practices since they have to explain their rationale for doing what they do in the classroom to the PSTs [23]. Clinical residency teaching programs are mutually beneficial for pre-service teachers and cooperating teachers in that reciprocal learning occurs [24]. Furthermore, mentoring a clinical residency pre-service teacher is positively associated with an increase in teacher effectiveness for the cooperating teacher [25]. Additionally, CTs view candidates as colleagues, allowing them to not only share the instructional and administrative load, but also reducing isolation and providing emotional support when dealing with the challenges

of teaching. All of this extra support in the classroom leads to a more rewarding teaching experience [23].

This study aimed to examine the motivations for serving as a STEM cooperating teacher and how pre-service teachers, in a year-long clinical residency program, promote growth in the professional practice of STEM cooperating teachers as teachers and teacher leaders. Our findings provide additional evidence of the benefits of serving as a cooperating teacher in a clinical residency teaching program.

2. Materials and Methods

2.1. Participants and Data Collection

The participants consisted of ten cooperating teachers (six female and four male) with a range of 7 to 18 years of full-time teaching experience. Our participants (eight high school teachers and two middle school teachers) were recruited from five different high-need schools (four high schools and one middle school) in three partnering school districts associated with our clinical residency program. Of the ten cooperating teachers, seven taught biology, two taught mathematics, and one taught chemistry. The cooperating teachers mentored between 1 and 6 pre-service teachers enrolled in a year-long clinical residency program throughout their teaching careers.

A longitudinal qualitative study was conducted to investigate the long-term impacts of clinical residency pre-service teachers on the professional practice of cooperating teachers as teachers and teacher leaders. Qualitative data were gathered by two methods: (1) semi-structured interviews and (2) survey questions over a period of five years (2018–2022). Informed consent was obtained from each participant prior to data collection. The semi-structured interviews, led by an external evaluator at the end of each clinical residency year, were conducted in-person, by telephone, or virtually via Zoom and lasted between 20 and 40 min. Surveys, containing the same questions used in the interviews, were conducted annually, by the external evaluator, for two additional years following the interview in order to investigate long-term impacts. Cooperating teachers that mentored one pre-service teacher during this study participated for three consecutive years ($n = 5$), whereas those that mentored more than one participated for up to five consecutive years ($n = 5$). The external evaluator generated transcripts from the interviews and compiled survey responses for each participant. The following open-ended questions were used in both the interviews and surveys to evaluate the motivations for serving as a cooperating teacher and how pre-service teachers in a year-long clinical residency program promote growth in the professional practice of cooperating teachers:

1. What made you interested in becoming a cooperating teacher (CT)?
2. What might you say to another teacher who was considering becoming a CT?
3. Describe the ways that your experience as a CT influenced you as a teacher.
4. Describe any specific instructional practices that you learned about from your pre-service teacher (PST).
5. Describe which of those instructional practices you have continued to implement in your own teaching after your PST's clinical residency with you.
6. Describe the ways that your experience as a CT influenced you as a teacher leader.
7. Describe any teacher leadership activities that you may have engaged in or led in the past year.

2.2. Data Analysis

This study utilized a thematic analysis [26–28] to analyze the interview transcripts and survey responses. We used an inductive, bottom-up approach in which the codes and themes were derived by the content of our data. Following the thematic analysis protocol by Braun and Clarke [26], we familiarized ourselves with the data by reading the transcripts, taking notes and making initial observations, generating initial codes, and searching for potential themes. After defining our codes, one transcript was coded at a time. The coding process was carried out by two researchers separately and subsequently

discussed until a consensus was reached. The themes that emerged from the analysis of CT outcomes were the following: (a) desire to share their experiences and support new teachers; (b) increased self-reflection and continuing reflective practice; (c) meaningful collaboration with pre-service teachers; (d) learned new teaching strategies to enrich their own teaching practice; (e) improved communication skills; and f) impetus to become teacher leaders.

2.3. Ethical Considerations

In each case, confidentiality and purpose were shared at the beginning of each interview and survey. The participants were informed that participation was voluntary, that individual responses would be confidential, and that the interview and survey results would be used as part of the clinical residency program evaluation and to inform the national conversation on teacher education programs regarding the impact of pre-service on the cooperating teachers' professional practice. Informed consent was obtained from each participant prior to data collection. The external evaluator assigned each participant a code (CT 1—CT 10) to maintain confidentiality and anonymity. Our study protocol was reviewed by our university's IRB in accordance with the US Department of Health and Human Services (DHHS) and Office for Human Research Protections (OHRP) regulations, specifically 45 CFR 46.104. Based on these criteria, this study was exempt from IRB review.

3. Results

3.1. Reasons for Being a Cooperating Teacher

Under this theme, we wanted to determine the reasons and motivations for agreeing to serve as a cooperating teacher.

The prominent reason for serving as a cooperating teacher was the desire to contribute to the profession and help train high-quality beginning teachers (n = 9). Interestingly, the motivations for CTs remained stable pre- and post-pandemic. Some cooperating teachers had participated in a year-long clinical residency program as part of their own pre-service teaching experience and felt that they had a big head start their first year as a result. CTs wanted to share their experiences and support new teachers since they had benefited from help and support throughout their teaching careers; many cooperating teachers stated verbatim that they wanted to "pay it forward" (n = 6):

> There really are two main factors. One is I feel like there is an obligation to some degree on the part of people who are current teachers to try to do our best to offer whatever we can to people who are becoming teachers. You know, it's that saying, pay it forward. My student teaching was incredibly important, I mean the time in the classroom was good, but also the learning theory and the university setting was good, but the time interacting with students, being there having to do things myself and figure things out and perform. That was so incredibly important to me, learning how to teach, so I feel like that only happens if people are willing to be mentor teachers. (CT 4)

When asked what they would say to another teacher who was considering serving as a cooperating teacher, the CTs indicated that they would share that in addition to giving back to the profession by training the next generation of teachers, there are also personal benefits including the opportunity to co-teach with a potential future colleague, time to focus on developing their own lessons, and visiting coworkers' classrooms to observe additional instructional practices (n = 9). As a result, it allowed them to grow as a teacher themselves:

> I would just say it feels so good to know that you're making an impact on training a new teacher. And you're helping that person become a teacher. Teaching in and of itself is definitely a calling and so you have to have a part in helping other people pursue their calling and that is really important. Selfishly, a highlight is that you can be out of the class for a little bit of time when they take over in January! It's pretty nice because you can actually get some other work done. That's not why I chose to do it, but it was a nice little part of the process. And,

> actually it's not even just time to do work, but I spent time getting into other people's classrooms, my coworkers, who I never get to see teach. I don't get to see the awesome ideas that they have, or the way that they organize their classes because I'm always teaching myself. And so, having that opportunity was really, really awesome. But in some ways, I think that helps us grow as teachers, too, to get out and see other teachers. You get to see and know what they're doing. (CT 2)

3.2. Self-Reflection

Under this theme, we determined that mentoring a pre-service teacher impacted a CT's self-reflection and continuing reflective practice.

Every CT surveyed (n = 10) noted a greater ability to reflect on their own lessons and teaching practices due to mentoring pre-service teachers. They stated that taking the extra time to explain their rationale to another educator was challenging. However, the thoughtful and intentional communication of teaching rationales to their PST allowed them to better understand and improve their own instructional practice, which also benefited their students. One CT elaborated:

> I think that becoming a CT allows you to reflect and hone some of your best practices. It allows you the chance to communicate what works well in that content area and that it is a great opportunity to have an inward reflection on your leadership and your ability as a teacher within your content area. And to have a better understanding of how all the pieces come together to hopefully provide the best education for our kids. (CT 8)

CTs also reflected on how mentoring a pre-service teacher improved their self confidence in their own profession and ability to communicate with others (n = 3). This validated their own role as a teacher and teacher leader, and helped them assess their personal growth. One CT stated:

> [Mentoring] boosted my confidence a lot more. I'm a very self-reflective person, and I'm sort of always down on myself, like, how can I improve? What can I do better? But when you see a brand-new teacher coming in and the mistakes that they're making because they don't know yet, it helped me see how much I had grown even in 5 years. It definitely boosted my confidence. It helped me realize, oh, I really have come a long way in these 5 or 6 years. I did not anticipate that it was going to really help me as a teacher like when I agreed to do it. But it really did benefit me, not only with the confidence, but also just knowing how to communicate with other teachers a little bit better. (CT 2)

3.3. Promotes Collaboration

Under this theme, we determined that the partnership between CTs and pre-service teachers resulted in meaningful collaboration.

The CTs appreciated having a built-in colleague, which allowed for co-designing and co-planning lessons with pre-service teachers (n = 9). CTs indicated that one challenge of collaborating and supervising PSTs was that it is time-intensive. However, they felt that the positives of co-teaching outweighed any negatives. CTs indicated that PSTs provided encouragement and support regarding their own teaching. Students also benefited from the collaboration as it allowed for time to assist struggling students and offer additional instructional support:

> I tried to look at [my PST] as a colleague—I guess I am the mentor, but in the fall, I taught, we always co-developed, talked through plans, [they] always had suggestions, as time went on he had more input. I gave more input at the beginning of his teaching and scaled that down. Encouraged him to try new things. [They] chimed in when I was teaching, we both helped the kids. More like co-teaching throughout. Just having those discussions together and trying to

> have someone else there on a daily basis as a thought partner, and there's also something about it all for you as the mentor. There's always that little extra you do when there's another colleague in the room with you. You feel like you have to up your game a little bit, so I feel like there's a little bit of that as well. (CT 4)

Cooperating teachers also indicated that serving in this role led them to continue a culture of collaboration (n = 5) and that they utilized the learned co-teaching strategies with other teachers. These results support that working with PSTs led to long-term impacts on the professional practice of CTs:

> I learned many cooperative teaching techniques and how to utilize them effectively in my classroom. I use some of the co-teaching strategies with Special Education teachers in my classroom along with other paraprofessionals to make sure they're included in the instruction. (CT 3)

3.4. Teaching Strategies

Within this theme, we determined that cooperating teachers learned from the pre-service teachers and implemented new teaching strategies to enrich their own teaching practice. Cooperating teachers commented that since pre-service teachers were modeling lessons that promote student engagement, it allowed them to keep up with best practices and also it provided a refresher for forgotten strategies (n = 9). CTs were inspired by their PSTs to revise their own curriculum to include more active learning and real-world connections.

Cooperating teachers also mentioned specific learning strategies and lessons that they planned to implement in their own classrooms including new labs and project-based learning:

> [PST] did a whole PBL unit on infectious disease [covering a] brand new standard [on] bacteria [and] viruses. She spearheaded the unit to teach them and I would like to use that unit in the future. [Another] strategy that I am 100% stealing and using forever—I had never heard of "word of the day"—embedding vocabulary into the day. I've done word walls, flash cards, and other things. I loved how she did this—word posted on board, had to write it down and the definition, and the word was related to the lesson that day, usually content (like force), sometimes it was about teamwork (like persistence). It was always an important word but not always content. Then she referenced the word throughout the unit days prior [and] had kids talk about it again. Such an easy way to embed vocabulary every day. It was fantastic. Later in the lesson they would already understand the word! (CT 2)

Cooperating teachers also indicated that they have continued to implement the pre-service teachers' strategies in their own teaching (n = 7). These results demonstrate that working with PSTs led to long-term impacts on the teaching practices of CTs:

> There are quite a few things that I have kept over the years. I have continued using an exit ticket that allows me to assess both student confidence level and whether they actually got the problem correct. Another [strategy I use] is to let students self-segregate during work time depending on how much help they think they will need. Students who are confident can go ahead and get started, while students who need more help will be grouped together so that I can work with them all at once rather than just one at a time. (CT 4)

Cooperating teachers indicated that mentoring pre-service teachers, particularly during the COVID-19 pandemic, enabled them to learn new technology tools and teaching strategies from their PSTs to engage students both in-person and in a virtual classroom (n = 7). For example, one PST used digital bulletin boards that allowed students to post and save all types of content including videos, images, text, and websites. Furthermore, CTs said that after observing their PSTs, they now contemplate how to teach the curriculum in multiple ways and are more willing to consider student learning preferences. CTs com-

mented that post-pandemic students do not want online assignments and instead prefer hands-on labs and activities. As one CT noted:

> Working with [the PST] was phenomenal, she was always prepared. She had to do virtual, hybrid, in person and she adapted and did really well and it prepared her for next year. For me, now if I have a sub I have tons of stuff! It was a challenge but we have to take a step back and see the growth that we all made—veteran teachers too—we've opened our eyes about how we teach curriculum in different ways. (CT 3)

3.5. Enhanced Communication

Under this theme, we determined that CTs had developed enhanced communication skills as a result of hosting a PST.

CTs felt that serving as a mentor improved their ability to give feedback to colleagues, PSTs, and students (n = 7). CTs specifically highlighted their growth in providing feedback to others with different styles and communicating with stakeholders at all levels: classroom-, department-, and building-wide. One CT stated:

> I think I'm more willing to have discussions and talk about things, and I always find something new through others and ideas for what my students might like better. I think having that practice being a [PST] myself and then having two [PSTs], where we had that open communication, of sharing ideas, I think, especially influenced me. I'm a lot more open to go to any staff meetings, department meetings, team meetings in our building and say, Hey, I found this and our kids really like it, you may want to try it, or have we found something else that the students really like? It's just open communication and sharing. We have a couple of new teachers teaching [content] in my school, and I'm always checking up on them, [saying] Hey, do you know what we're doing for [lab]? Do you need help? Because of my [PSTs], I'm more open to discussing and having ideas exchanged with my staff members. (CT 1)

CTs also noted that they kept in touch with the pre-service teachers after the clinical residency was complete, either as their new in-school colleague or as an external collaborator outside their school/district. CTs said that they maintain both social and professional ongoing relationships with former pre-service teachers and that they considered them trusted colleagues (n = 9). While they found it easier to maintain connections with those that were hired at their schools, they also shared information and resources electronically via texting, emails, and shared drives with former pre-service teachers in other schools to build a professional network. One CT stated:

> [PST] works in our district and is in the building right next door. We just saw each other at the textbook adoption meeting. We email back and forth, sometimes asking for a resource or lab. With all my [PSTs], I tell them, it's like you're one of my kids, even though you're out of my house. You're always welcome back and you're always welcome to call, or text, or whatever the case is. You know I want you to have that sense that you can still lean on me when you need it. (CT 3)

3.6. Leadership

In this theme, we explored ways in which the cooperating teacher's experience in mentoring pre-service teachers continued to influence them as a teacher leader. A recurring theme was that the process of mentoring pre-service teachers helped CTs develop mentoring skills for other roles. Cooperating teachers stated that they were more comfortable in teacher leader roles at the department and school level as a result of hosting a PST (n = 8), which allowed them to develop a rich new skill set including coaching, completing evaluations, and communicating best practices. They also began mentoring new teachers and became better problem solvers as a direct result of hosting a PST. One CT stated:

> Being a CT allowed me to develop my teacher leader skills and abilities. It helped me learn ways to articulate best practices to new teachers and the best types of questions to ask to facilitate reflection. It also helped me identify common "student-teaching" mistakes so I can help mentor new teachers in my department. The experience of being a CT helped instill more confidence in me to lead other science teachers. In addition, since my [PST's] personality was very different than mine, my experience with being her CT has helped me learn better ways to interact with different types of individuals. The more experience you get with leading other teachers the more the school wants you to do it, but also, the more you realize yeah, I can do that. I'm confident with doing that. I have that ability. And so, you take on more responsibility. (CT 2)

Cooperating teachers in this study also specifically noted that mentoring a pre-service teacher motivated them to become school leaders in curriculum development, knowledge sharing, and community building (n = 5). One CT linked their leadership to current, state-wide educational reform:

> Those of us who have experienced [PBL from our PST] can be a mentor at our school. [PBL] was brought by my [PSTs]; as a CT, I saw it done somewhat successfully. Our school has started PBL this year, so those who have experienced it can be a mentor at our school. [Our state] now has the [new] pathways to graduation [which includes required inquiry-based components such as] PBL. Those of us who have done [PBL] can be mentors. And throughout the year it's just been momentum to get that going, and when people have questions they come to me or to [the PST], and I think having us there is really, really helpful for the whole school, the whole department. [It was] definitely helpful to have me and [the PST] in the school to help teachers while they are actually doing it. (CT 7)

4. Discussion

In this study, we examined the motivations for teacher educators serving as cooperating teachers and the ways in which mentoring a pre-service teacher, in a year-long clinical residency, positively influenced and benefited the professional practice of cooperating teachers. This novel, five-year study addresses the gaps in knowledge by assessing the long-term impacts of hosting a pre-service teacher. We found that mentoring pre-service teachers had a significant positive impact on CTs and promoted long-term sustained growth in their professional practice in multiple domains including self-reflection, collaboration, teaching strategies, communication, and leadership abilities.

The primary reason for serving as a cooperating teacher was their intrinsic motivation and desire to share their expertise and support new teachers. They were thankful for the mentors who had helped, encouraged, and supported them throughout their teaching careers and as a result, they wanted to "pay it forward". CTs reflected on their own experiences as pre-service teachers and indicated that they did not want others to be just thrown into the classroom; they had a strong desire to provide a support system for new teachers. The drive to share knowledge and encourage new teachers supports past research from Russell and Russell [29]. CTs also felt that they had an obligation to the profession to help the future generation of teachers learn how to teach and become a teacher. Some CTs had participated in a year-long clinical residency program as part of their own pre-service teaching and knew how beneficial it was to have an entire year of student teaching experience, which allowed them to experience the day-to-day practices of an educator, and they wanted to provide the same opportunity for others. The desire to contribute to the profession and help ensure better-quality beginning teachers agrees with previous findings [21,23,24,29,30].

When participants were asked what they would share with another teacher who was considering becoming a cooperating teacher, they indicated that serving as a cooperating teacher helped them grow as teachers too. It provided the opportunity to co-teach

and collaborate with potential future colleagues. In addition, it gave cooperating teachers more time to develop their own lessons or spend time in colleagues' classrooms to observe different teaching methods and styles. This research affirms the previous findings [29,30] that describe the motivation to serve as a cooperating teacher to benefit one's own professional development.

Most of the CTs remarked that they had to more deeply understand their own profession to be able to teach someone else how to do it. The process of mentoring a pre-service teacher provided them with an opportunity to reflect on their own practices and helped them grow as a teacher and provided some life lessons and encouragement as they navigated their own careers. Mentoring gave them insight into the teaching profession, as they learned to see things from the pre-service teacher's perspective, how to evaluate whether a lesson worked or did not work, and how to better articulate the teaching process. One CT also noted that mentoring helped them better understand how all requisite components needed to come together to provide the best possible educational experience for the students.

Mentoring also contributed positively to the CTs' identities as reflective, adaptive, life-long learners. The CTs experienced a renewal in their own attitudes, approaches, and teaching practices as a direct consequence of mentoring pre-service teachers. These findings corroborate the literature, which indicates that mentoring a pre-service teacher has a positive impact on a cooperating teacher's self-reflection [22,23,31,32].

The added benefit of a year-long clinical residency program is that it provides additional time for cooperating teachers and pre-service teachers to establish and build a strong working relationship. This partnership between CTs and pre-service teachers resulted in meaningful collaboration. CTs appreciated having a "thought partner" or built-in colleague with whom to co-design and co-plan lessons. Over time, pre-service teachers moved from mentee to colleague and provided more input and suggestions on lessons implemented in the classroom. Co-teaching also created the opportunity to provide extra support to students who were struggling in the classroom and enabled both the teacher and pre-service teacher to work with students in small groups. The benefit of extra support in the classroom enabled the cooperating teacher to share instructional planning. Students needing additional academic support also benefitted, as observed in other recent studies [6,23]. Cooperating teachers also indicated that serving in this role has led to a continued culture of collaboration in that they are more willing to have people observe their teaching and engage in conversations about teaching methods with other colleagues. Furthermore, CTs continue to use the co-teaching strategies with their special education teachers and other paraprofessionals so that everyone is included in instruction, which broadens the impact. The benefits of co-teaching to promote the professional development of cooperating teachers aligns with previous findings [6,20,21].

The ability to enrich their own teaching practice and learn new teaching strategies was another benefit for cooperating teachers hosting pre-service teachers. CTs commented that because pre-service teachers modeled lessons that promote student engagement, it allowed them to keep up with best practices and it also provided a refresher for forgotten strategies. Since CTs mentored pre-service teachers during the COVID-19 pandemic, they also learned new technology tools and strategies to engage students in a virtual classroom. Shields et al. [33] also found that pre-service teachers were more proficient with technology tools and taught their classroom mentor teachers how to utilize technology effectively. CTs indicated that they planned to implement specific lessons and strategies, used by pre-service teachers, in their own classrooms. These included new labs designed by pre-service teachers, which provided real-world context for students on topics such as cell division and evolution. CTs mentioned that they planned to revise their curriculum to include more student engagement and had more ideas for labs as a result of working with their pre-service teachers. These findings align with previous research indicating that cooperating teachers learn from their pre-service teachers and it promotes instructional changes in their own teaching [20–22]. Furthermore, veteran CTs stated that they have

continued to implement the PSTs' strategies in their own teaching, such as using an exit ticket strategy to assess student learning and allowing students to self-segregate during work time based on their confidence of understanding, enabling the teacher to focus on helping students who need more help.

Project-based learning (PBL) was a key component of our year-long clinical residency program. Our pre-service teachers engaged in PBL as part of their coursework, and they were required to design and implement a PBL unit (over a four- to six-week period) in their classroom. Multiple CTs commented that they planned to use their pre-service teacher's PBL unit in their own teaching. In an effort to improve instruction in STEM, our state (Indiana) is requiring that 100% of K-12 teachers be trained in problem/project/inquiry-based approaches to learning by 2025 [34]. As a result, some of our partnering school districts have adopted PBL as part of their curriculum. Since the CTs had invaluable PBL experience, due to mentoring pre-service teachers, they were not only able to effectively implement PBL in their own classrooms, but they were also able to facilitate implementation by other teachers in their district. In fact, CTs stated that their acquired teaching strategies from pre-service teachers also included learning how to facilitate learning for adults.

The cooperating teachers in this study commented that serving as a CT enhanced their communication with colleagues, pre-service teachers, and students, leading to more fruitful relationships and collaborations. They interacted with more patience at staff and team meetings and were more analytical and open-minded in regard to problem solving. They cited improved professionalism and clarity in their communications with both teachers and pre-service teachers, stating that mentoring made them more verbally reflective and more able to clearly state the rationale of their methods. The experience of mentoring also taught them to use coaching language and to provide constructive feedback to promote growth in the pre-service teacher and other new teachers in the building. Mentoring also impacted their communications with the students in their classroom. After observing their pre-service teacher's interactions with students, they learned new ways to approach students in a more respectful manner and were more cognizant that everyone's approach to learning can be different.

The positive mentoring relationships and successful residencies resulted in several pre-service teachers being hired at the building where they carried out their clinical training. This facilitated easy collaboration and sharing of ideas, content, and lessons between CTs and their former pre-service teachers. However, even for those pre-service teachers that were hired by other schools/districts, CTs' responses indicate that they regularly and consistently engaged in communication with their former pre-service teachers, keeping up by social media and continuing to collaborate even with those outside their district. This reduced the sense of professional isolation [35,36] as the CTs built a network of like-minded teachers via long-term relationships that cut across years and districts, in essence, creating an informal professional learning community [37].

Serving as a cooperating teacher can positively impact a teacher's career by validating their experience in teaching and curriculum design, which can open the door to leadership opportunities [38]. Other studies have shown that the experience of coaching directly impacts a teacher's professional development [39]. Moreover, fostering teacher-to-teacher contact helps encourage the development of teacher leaders [40]. In this study, cooperating teachers made significant gains in mentoring and leadership skills as a direct result of hosting pre-service teachers. Being a CT contributed to their willingness to take on other teacher leader roles due to becoming more confident in their abilities. Hosting the pre-service teacher made a direct impact on how they could translate their learning to their colleagues as they could explain the strengths and challenges of a lesson to other teachers and use coaching language to provide constructive feedback. Outside of direct teaching applications, CTs also expressed that they were encouraged to serve in more impactful roles in their schools. Their successful mentoring of emerging teachers made them more willing to share ideas at team meetings and more likely to check up on new teachers. Their newly learned communication strategies also encouraged them to step into formal

and informal mentoring roles within their school. Overall, being a CT contributed to their engagement in the community as a peer mentor, instructional coach, and leader in curriculum development. Moreover, the program's emphasis on project-based learning also provided an opportunity for CTs to become leaders in PBL curriculum development. Serving as a cooperating teacher even prompted one CT to pursue a master's degree in curriculum and instruction.

In conclusion, several themes emerged in this study, which support and expand upon previous research on teacher education and the benefits to teacher educators serving as cooperating teachers. All cooperating teachers interviewed expressed a strong desire to share their experiences to support new teachers and "pay it forward". The cooperating teachers indicated that the most common benefits of mentoring pre-service teachers were increased reflection on their own practices while articulating instructional strategies to new teachers; meaningful collaboration with pre-service teachers and building a long-lasting social and professional network; the acquisition of new teaching strategies to enrich their own teaching practices; development of effective communication skills for successful collaborative processes; and an inclination to move into teacher leadership roles, such as formal and informal peer mentoring, instructional coaching, or leading curriculum development. The findings from this multi-year study demonstrate that hosting a pre-service teacher in a year-long clinical residency positively and sustainably impacts a cooperating teacher. Cooperating teachers play a critical role in teacher education and this mutually beneficial relationship enriches their growth and professional practice as teacher educators and teacher leaders.

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