Team Teaching and Learning: A Model of Effective Professional Development for Teachers

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This longitudinal qualitative study investigated the impact on teacher participants of using a unique laboratory approach to professional development: the Team Teaching and Learning (TTL) framework, which integrates five traits from Garet, Porter, Desimone, Birman, and Yoon's (2001) empirical research on teacher professional learning, including content knowledge, active learning, coherence, collective participant, and duration. Participants included 24 teachers in one high-poverty school district in the Northwest United States who participated in a three-week summer professional learning experience. Results indicated seemingly high implementation of professional development content, which also appeared to be sustained over the two-year time frame of the study. This pilot study of TTL contributes to literature on collaborative teacher learning and provides school leaders with numerous recommendation strategies that make implementation successful. The TTL framework is founded in empirical research and utilizes best practices for teacher and adult learning.

Keywords: professional development, teacher learning, team teaching

Introduction

Although 99% of public school teachers and 95% of private school teachers reported participating in professional development (PD) experiences in the previous 12 months (Schools and Staffing Survey, 2011), teachers generally report low satisfaction with most professional development experiences (i.e., Bill and Melinda Gates Foundation, 2014; Wei et al., 2009). This issue is compounded because professional development is expensive: in just one year, $1.5 billion of federal government money is spent on teacher development (Birman et al., 2007), with some districts spending up to $18,000 per teacher, per year, on professional development (Jacob & McGovern, 2015). Yet, there is evidence that shows that investing in teacher professional development, when implemented with care, can save districts money, improve student learning, and reduce teacher turnover (Guskey & Yoon, 2009; Villani, 2009; Villar & Strong, 2007). More research is needed to advocate for meaningful teacher learning experiences that can benefit students and engage adult learners.

While teachers appear to be unsatisfied with their professional development experiences, there is a plethora of research identifying characteristics of effective teacher development. These characteristics include empowering teachers through self-improvement, promoting reflective practice, extending learning experiences over time, and ensuring teachers participate in hands-on learning (Butler, Lauscher, Jarvis-Selinger, & Beckingham, 2004; Darling-Hammond & McLaughlin, 1995; Garet et al., 2001; Joyce & Showers, 2002; West, 2002). Additionally, literature suggests that professional development should be research-based, collaborative, and focused on equity and quality teaching (Hirsh, 2007). A collaborative, team approach to professional development integrates many of these effective traits and often includes student and teacher focused goals. When research-based qualities are integrated into professional development experiences, there is great potential for teacher learning. Unfortunately, many traditional professional development experiences involve a one-time experience determined by school leadership, and the experience is often passive and intermittent (Butler et al., 2004; Stewart, 2014), which likely leads to the high levels of dissatisfaction with the experiences.

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One key empirical study that identified characteristics of effective professional development emerged from Garet et al.'s (2001) research. Garet et al. (2001) surveyed a national probability sample of over 1,000 mathematics and science teachers and identified several distinguishing characteristics that showed significant positive impacts on teacher knowledge, skills, and classroom practice. These features included:

1. Focus on content knowledge, including subject-area knowledge, pedagogical knowledge, or teaching and management methods. Participants need to understand the learning objectives and how students learn content.

2. Opportunities for active learning, such as collaborative planning, peer observations, and reviewing student work. Active learning can also include data analysis, discussions, and watching others teach.

3. Coherence with other learning activities, including aligning with standards, building on prior teacher learning, and focusing on sustained and collaborative communication with other teachers. Learning experiences need to be relevant to teacher belief systems, school initiatives, and policies.

4. Collective participation of teachers from the same school, grade, or subject, which can allow for more collaboration, integration, and targeting of specific student needs.

5. Duration, meaning learners should work together for a semester at minimum and have at least 20 hours of contact time (Garet et al., 2001). Duration has been a focus in numerous research studies on professional development. Yoon and colleagues (2007) determined that studies that involved 49 hours of contact time showed positive effects on student achievement. Guskey and Yoon (2009) identified 30 hours as the cut point for effective learning, including both structured and follow-up time. Despite the identification of extensive hours for effective learning, the Schools and Staffing Survey (SASS, 2011) reported that fewer than 50% of teachers receive 17 or more hours of professional development annually (Wei, Darling-Hammond, & Adamson, 2010).

Although there is a broad range of professional development models, often these experiences lack an integration of research-based best practices for teacher learning. This research utilized Garet et al.'s (2001) findings as a springboard to creating a new, innovative professional learning model: Team Teaching and Learning (TTL).

TTL was developed because the school district involved in this study was seeking an innovative and meaningful professional development experience for teachers that would produce better, long-term results. The district had recently rolled out a new program for teaching English Language Learners (ELLs), and had discovered that after three years of roll-out, teachers were still struggling to implement the program with fidelity. These teachers were seeing little success despite extensive, expensive professional development on the topic, most of which was traditional "sit-and-get" variety. Thus, after a thorough combing of the literature, current research, and PD models available, the TTL framework was developed, aiming to integrate Garet and colleagues' (2001) five traits into a laboratory model for teacher professional learning that involves authentic team teaching over an extended period.

Team Teaching and Learning

The TTL framework entails several key qualities, including team collaboration, an authentic learning environment, peer reflection and feedback, and extended duration. First, teachers are formed into a team, ideally of three or four individuals. Depending on the purpose of the learning experience, the group should be differentiated appropriately with clear roles for all members, such as mentor, coach, and classroom teacher. More details about forming effective teams are discussed later. Next, TTL involves participating in an authentic learning experience, meaning the teachers should be able to plan and implement content or strategies in a true learning environment with students, such as in their own classrooms or a summer or after school program. TTL also involves reflective peer feedback, which may vary based on the purpose of the learning experience. For instance, teachers may co-plan a unit of study, then co-teach the unit while simultaneously reflecting as a team and adjusting teaching to improve student learning. The final element of TTL involves extending learning, such as a designated summer learning experience or a collaborative teaching experience throughout a school year. Extended duration occurs cyclically and includes reflective peer feedback (see Figure 1).

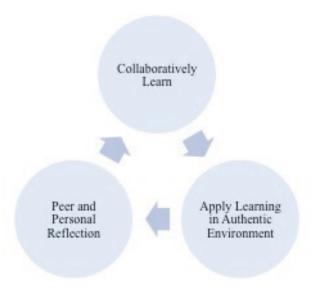## Utilizing Team Teaching and Learning

Figure 1. Team Teaching and Learning Duration Cycle

TTL can be used to achieve a variety of professional learning goals. For instance, TTL can help teachers learn and practice co-teaching strategies, learn to collaborate in a Professional Learning Community (PLC), collaboratively teach content-based material, teach across the curriculum, practice peer observations and feedback, or learn to conduct a Lesson Study. TTL can also be used to help teachers integrate a new curriculum, implement school or district goals, become familiar with new testing regulations, or enrich work with Special Education or English Language Learner teachers. TTL could also be used as an onboarding strategy to mentor new teachers while likewise engaging veteran teachers. In addition to Garet et al.'s (2001) components, the characteristics of TTL draw from several other effective, largely 'reform' PD models, including Lesson Study, learning labs, co-teaching, and situated professional development. Reform teacher professional learning focuses on professional collaboration and authentic learning experiences.

Firstly, TTL draws on Lesson Study, a Japanese collaborative learning model that is gradually gaining in popularity in the United States, that involves five distinctive characteristics: (a) lessons are collaboratively planned over a long period of time; (b) lessons are observed by other teachers; (c) lessons focus on broader educational goals; (d) lessons are recorded, through video, audio, notes, and/or student work; and (e) lessons are discussed (Lewis, 2000). The TTL model occurs in shorter cycles but involves collaboratively planned lessons that are observed by other teachers and later discussed and reflected on.

Second, TTL draws on learning labs, which involve many of the same traits, but specifically adds explicit professional development and coaching to the collaborative Lesson Study experience. Research from Haug and Sands (2013) on the effects of one learning lab, which included collaborative planning, professional development, and coaching, found positive differences in instruction, student grouping, and the nature and demand of tasks for participants. Third, TTL expects teachers to not simply observe each other, as in Lesson Study and the learning lab, but also utilizes co-teaching. Almon and Feng (2012) found that co-teaching had a more positive effect on student math achievement than solo teaching. Finally, TTL also drives on situated professional development, in which learning (about teaching in this case) is situated within experience (Glazer & Hannafin, 2006), which has also shown statistically significant growth in teacher implementation of instructional strategies (Singer et al., 2011). TTL emphasizes characteristic of reform and authentic learning, where real students are participants when adult learners are applying learning content. These studies on the varying components of a TTL model provide insight into the potential benefits of a laboratory approach to teacher learning; however, there is a definite dearth of research on not only the components of TTL but the model as a whole.

Theoretical Framework

The learning lab approach to professional development relates to several learning theories. First, Bandura's (1977) social learning theory is reflected in the collaborative learning environment of teachers working on teams. Additionally, teachers participate in collective learning experiences through collaborative planning and teaching, followed by feedback and reflection (Lave & Wenger, 1991). Teachers' professional identities are impacted by this shared learning experience. The laboratory experience is further supported by adult learning theory, or andragogy (Knowles, 1980), which advocates for learning experiences that are meaningful and relevant to the adult learners. Teachers participate in co-planning and co-teaching, and then engage in reflective dialogue with colleagues that can directly lead to changes in practice.

Methods

This qualitative research study investigated the application of the Team Teaching and Learning (TTL) model of professional learning in a pilot study in one school district in the Pacific Northwest of the United States. It sought to answer the following research question: To what extent does this newly developed TTL framework have the capacity to meet Garet et al's (2001) five core framework characteristics? This pilot study contributes to the dearth of current literature on effective learning experiences that can be sustained to improve teacher implementation of programs, strategies, and pedagogies, with the ultimate goal of enhancing student learning.

Participants and Context

Participants in this study included 24 teachers from one school district who attended a three-week summer professional learning experience focused on content embedded language acquisition and literacy. Teachers in this TTL pilot research study were assigned to one of six teams, each of which included one English Language Development (ELD) teacher, one instructional coach, and two classroom teachers. Each team taught a different grade level: kindergarten, first, second, third, fourth, and fifth grades. The purpose of the learning experience was to increase pedagogical content knowledge of teachers while at the same time supporting students (in this case, the particular learning experience focused on English Language Learners (ELLs)). These students were from one school, while the teachers were from schools across the district who were recruited to attend the three-week summer school that operates each summer. Teachers taught the students for three hours each morning of the three-week summer school, utilizing both peer observation and co-teaching pedagogies. Following the morning teaching experience, teachers spent two hours each afternoon in professional development sessions, collaborative planning, and group and self-reflection time. There was a total of 60-hours of time in this professional learning experience. It was hoped the team-based professional development experience would build the capacity of teachers to use specific teaching strategies when working with ELLs with an aim of long-term gains in student achievement.

The years of teaching experience ranged from 1 to 25 ($M = 8.63$, $SD = 6.89$); however, six of the participants (25%) had only one year of experience. Student district demographics were racially/ethnically, socioeconomically, and linguistically diverse: 80% of the students were economically disadvantaged, 65% of the students in the district were non-White, 45% of students were identified as ELLs, and over 40 different languages were spoken by students in the school district. The district paid teachers for teaching at the summer school, and additional professional development funding supplemented the team-teaching experience.

Data Collection and Analysis

The data for the TTL pilot study were collected in two phases. The first phase of this study occurred during the three weeks of the summer professional learning experience. This phase included the hours of the summer school instruction plus the collaboration and professional development time for all the participants. These sessions were observed every other day, and field notes were taken. These notes detailed participants' various roles in the Team Teaching and Learning experience and interactions between participants. In addition, semi-structured interviews were conducted with participants, which were audiotaped and transcribed. Questions for the interviews were constructed to investigate the perceived value of the professional development experience, the working relationships on the teams, and specific practice changes based on role assignment. The domains and subdomains of each concept were further delineated after review of the literature (Dillman et al., 2009).

Data continued to be collected during the subsequent school year, using a longitudinal approach to investigate extended learning experiences of the teachers, ELD specialists, and instructional coaches who had

participated in this training. Follow-up interviews (about 30 minutes each) were conducted with each of the participants during the following year to investigate the long-term effects of the training. Questions targeted whether teams utilized the resources developed during the TTL experience, continued collaborating as a team, and integrated the teaching strategies learned during the summer lab into their daily classroom practice. A third source of data was collected from responses to an interview with the administrator who oversaw this new model of professional development; this provided a multi-instrument approach, or triangulation (Gay et al., 2012).

The qualitative data from the interviews and observations were analyzed using provisional coding (Dey, 1993; Miles et al., 2014), which uses predetermined codes to analyze data. Garet et al.'s (2001) descriptors of effective professional learning were applied to the qualitative data.

Results

This qualitative study of the Team Teaching and Learning (TTL) professional development model resulted in seemingly high implementation of the professional development content, which also appeared to be sustained over the two-year timeframe of the study. The data revealed numerous exemplars of the core framework characteristics, which were garnered from Garet et al.'s (2001) empirical research on teacher professional development. These features included: content knowledge, active learning, coherence, collective participant, and duration.

Content Focused

The first element in the Team Teaching and Learning framework is a focus on content knowledge. The pilot study focused on teaching strategies that can be implemented in any content-area, so the "content knowledge" code was applied to data related to teaching strategies. For instance, observational data showed teacher teams working collaboratively to implement strategies from the professional development to help ELL students, such as charting narrative text and sentence patterning. The data revealed positive feedback regarding the authentic nature of the professional learning experience, specifically learning strategies that can be implemented in the classroom during the school year. TTL allowed participants to experience professional learning in a true classroom environment with actual students, working alongside professional colleagues. One participant stated, "I felt like I was able to learn and do at the same time, and learn and do, and go back and forth." The authenticity of TTL was exhibited through the hands-on nature of the learning and the true classroom environment, which allowed participants to immediately apply knowledge.

Teachers reported an improvement in teaching pedagogy during the year following participating in the TTL approach. One participant said, "I learned a lot of things, like being able to observe other teachers. I learned strategies that I didn't know." Another teacher, when asked if her teaching practice had changed responded: "Yeah, it definitely has changed. I look at things a lot differently now, especially since co-teaching needs to be involved."

Active Learning

One of the main points of positive feedback from participants was the active learning of the TTL professional development experience. The TTL professional learning team ideally includes three members. The members of the team each contribute their expertise to working towards the goals, which may include learning to implement content or curriculum with fidelity, learning to effectively support a particular student group (i.e., English Language Learners), or learning new pedagogy such as co-teaching, mentorship, or instructional coaching. Team members collaborate at multiple points of the TTL continuum, including planning, co-teaching, providing non-evaluative peer feedback, reflecting, and analyzing data.

Within the TTL framework, it is important that the team have designated roles, including an expert in the content or pedagogical strategy to ensure active learning occurs. Roles may include but are not limited to mentor, coach, classroom teacher, English Language Development teacher, Special Education teacher, etc. One participant stated, "It was also really helpful to have other people on my team have experience because I had never been through the process of doing a unit from start to finish, so during the … training you see all the pieces but it's done at super-fast speed, so getting the big picture and seeing how this strategy builds on the next one was really helpful." An expert can help teach other team members and help improve practice: "There were some strategies that I had like hit a wall with and didn't know how to do, and getting to see other people who were better at some strategies than I was, and vice versa, getting to see how they did it really

helped me." Another participant said, "One of the reasons why the understanding of the strategies blossomed is because we were seeing each other teach."

Data from participants in this research study provided overwhelmingly positive responses to the active learning that occurred from working in professional learning teams. One participant said, "I think the hands-on experience is a huge part of it…I feel like I know so much more just from doing that…And I can help my teachers who don't really understand it. So, I feel like I have definitely got a better grasp of how everything works." Teachers also voiced enjoyment in learning from each other: "I think it's really great for bouncing ideas off of each other and learning how another teacher does things."

Actively working in teams also allowed educators more time for reflective learning. For instance, one participant stated:

> You could always have someone take the role of observer and really be thoughtful of what you're doing, because when you're just the classroom teacher you don't always have time to be reflective about what you're doing, and having the opportunity to really think about this worked, this didn't, that was the piece that was really valuable.

Working in teams also allowed participants to "divide and conquer," "bounce ideas off each other," and gain multiple perspectives from other professionals in the field. However, many teachers know that opening your door to collaborative teaching and peer feedback also adds a vulnerability and intimidation factor that can be challenging. One participant said, "We still had some work to do with kind of stepping on each other's toes, and you know, there were some hurt feelings." Despite the challenges, participant feedback focused strongly on the benefits of working on a team, which was a clear example of active learning. This embedded form of professional learning is supported in the research as a current trend of best practices (Acevedo, 2013; Wei et al., 2010).

Coherence

The TTL framework is intended to be implemented within the context of a real classroom environment, making it a coherent, relevant learning experience for educators. Data for this pilot study was garnered during a summer school program serving low-achieving students, which also served as a professional learning experience for educators. Feedback from participants highlighted the value of the authentic learning environment:

> It is like jumping into somebody else's classroom but being able to be a part of it. And right afterwards, talk to the person that just taught and say, hey I noticed you did that, where would you learn that? How do I facilitate that? Can you write that down for me? So, it is like getting a peek into somebody else's classroom and then being able to talk to them about it and have the time to work together and share materials.

Another participant stated, "Usually [professional development] does not include implementation in practice in any way shape or form, and so it made me feel like, oh, I actually could do this." Teacher capacity and confidence seemed to increase in the authentic learning environment.

There was also high reflective peer feedback and a coherence of learning experiences that related daily teaching experiences. For instance, one participant said:

> I thought it was awesome to have an opportunity to collaborate in the midst of teaching, which is something that you don't often get in a regular classroom…you have to reflect on it later, but in the moment you can look up and say, 'What do you think? Do you think we should go in a different direction?' And it is almost like pushing pause on the kids. Figuring it out and just suggesting in it right there on the fly. I thought that was awesome.

The hands-on, real-life implementation of the professional learning content allowed participants to experience the relevance of the learning experience.

Collective Participation

Collective participation is another feature of the TTL framework, which Garet et al. (2001) describe as participants from the same school, department, or grade level working together in a professional learning experience. Collective participation allows participants to have shared skills, concepts, and problems of practice, in addition to similar curriculum, courses, and assessment requirements (Garet et al., 2001). These qualities can potentially lead to higher integration and sustainability of professional learning content.

The TTL pilot study included elementary teachers from the same grade levels. This feature seemed to foster collective buy-in and provide a support network that appeared to yield positive results. Participants reported feeling "confident" and "prepared." One participant stated, "I was more engaged because I understood it better, the kids were more engaged because I was more engaged." When asked to rank the TTL professional

learning experience from 1 to 10, with 10 being the best they have ever had, one participant summarized the experience: "I would say that experience was like a 9 or a 10 because it was hands-on professional development with students, with instantaneous feedback on what I was doing right, what I could do wrong. I had time to reflect with my co-workers, and we had a great looking team…It was such a good experience for learning for me."

Working in a team of teachers of the same grade level also seemed to encourage teachers to be more open to growth. One teacher said her colleague apologized for giving critical feedback, but she welcomed it, stating: "I'm here to learn and to be better. Will I make that mistake again? No!" Another said:

> At the end, being able to say, oh my gosh that was a disaster or wow, I really learned something new today. Just being able to talk with other professionals. Because you are on your own, you know, most of the time. Just being able to hash things out like that and get other people's expertise and perspectives on things was awesome.

An additional participant stated, "The feedback was so nice. And it was not like evaluative in any way. It was just, I saw you do this, maybe do this next time…Like a friend, a colleague alongside me. Not coming from above." Receiving feedback from peers and personally reflecting on one's professional practice seemed to improve adult learning.

The feedback from the TTL professional learning experience highlighted the efficacy of using adult learning practices when teaching teachers, including a hands-on approach that enables the learner to collectively participate in sharing knowledge, providing peer feedback, and being reflective. One participant said, "That was a hands-on experience where I feel like everything that I learned [during the TTL experience], I've been able to come back and either teach to somebody else or implement in a classroom much more solidly than I had before." The content and skills were immediately applicable. Participants were excited and engaged in the experience and eager to participate again: "I think it's a valuable thing and if they offer it again next year, I will absolutely do it again."

There seemed to be a direct link between feedback from teachers on the type of learning experience that the lab provided, and the sustainability of the strategies used. Many teachers mentioned an appreciation in learning the *why* behind certain strategies, which contributes to sustainable learning. Understanding the rationale for learning a new concept seemed to make the Lab a meaningful professional development experience. For instance, teachers spoke about sharing the news with others, about feeling empowered to implement new strategies, and about the desire to replicate the experience in the future. One coach said, "I thought it was extremely exciting because the team that I worked with kept saying things like, 'I thought I heard that strategy before but I never understood the point and now I get it and I'm going to tell people I work with why it's worthwhile.' And that's exactly what we want from a professional development experience."

Duration

The final element of the TTL framework is duration, which refers to the cyclical extended nature of the learning experience. Participants in this pilot study collaboratively taught for three hours each day for three weeks in a summer school program. Following instruction, participants met in teams for two hours each afternoon for planning, reflection, and professional development time. The duration of learning is truly a process, as stated by one participant: "It's a process…which I think is a really appropriate name for it, it's an adaptive change. So, we are trying to change the way everybody's teaching, we're not just trying to slap a worksheet or an activity on it and fix it." No matter the intended goal of the TTL professional learning experience, allowing for extended learning time in an authentic environment will impact the quality of the experience.

The length of the TTL experience can extend over several weeks, months, semesters/terms, or school years; this particular experience was over 60 hours of contact time across 3 weeks, which received positive feedback from participants. For instance, one stated:

> Usually when we have professional development, it is like okay here is your hour and a half on Wednesday and now…you can do it all on your own. And generally, that means you go back to your room and…you just throw up your hands because you cannot do it on your own. And so, it is really very nice to be able to say I do not know what I am doing and there were enough people around…we can figure this out. And you will learn what you need to do rather than just giving up because an hour and a half once a week or once a month is not enough.

By having extended time to not only teach, but also to collaboratively plan, learn, and reflect on the process, seemed to create an integrated experience that builds knowledge over time. For instance, one participant stated: "I knew some of the strategies, but I didn't

see how they were interconnected until doing them with people watching and talking about it." She needed to see the strategies implemented over an extended period of instruction (i.e., not just one sit-and-observe day) to fully understand how the components fit together.

This extended duration of the experience also allowed for the evolution of participants from cautious bystander to confident implementer. In this way, participation of certain teachers at a school can help create experts who can further enhance implementation of the new learning into the school. For instance, one participant stated, "Now we have all these teacher leaders that you know, have participated, who can bring their strengths back to their schools and to their grade level teams." The extended nature of this learning experience appeared to deepen participant knowledge, which can potentially increase implementation of professional development content.

Discussion

Team Teaching and Learning (TTL) is a new model for teacher learning that showed positive results in this pilot study. This approach to teacher professional development is grounded in research-based best practices and provides an innovative framework that can be replicated in numerous settings. Research on professional development reveals that teachers report that traditional types of development experiences feel irrelevant and disconnected from the classroom, often with conflicting goals between what is taught in the professional development and their own opinions or experiences (Allen & Penuel, 2015). In this research study, TTL participants were asked how they would rank this professional development experience compared to all professional development they have had in their professional careers on a scale of 1 (worst experience) to 10 (best experience). Participants ranked the Lab on average a 9 out of 10. These high ratings contradict most literature, which reports low teacher satisfaction with professional development opportunities (i.e., Bill and Melinda Gates, 2014; Wei, et al., 2009). Participants were also asked how much their practice had changed due to participating in the Lab on a scale of 1 (no change) to 10 (many changes), and the average was 7, indicating quite a bit of change.

The Team Teaching and Learning (TTL) approach to professional learning resembles a laboratory approach to teaching, which "focuses on long-term strategies intended to increase student achievement by improving the very foundation and quality of teaching and, in turn, student learning" (Haug & Sands, 2013, p. 198). There are consistent features in the research on several lab approaches, which directly align with research on effective professional learning. First, there is an instructional focus on collaborative planning and teaching (Desimone, 2011; Hirsh, 2009). Second, there is an academic and content focus on increasing student learning (Blank, de las Alas, & Society for Research on Educational Effectiveness, 2010; Pardini, 2006). Finally, there is a goal of improving professional learning through elements of reflection and collegial feedback, which is a repeated theme in research on effective teacher learning (e.g., Allen & Penuel, 2015; Darling-Hammond & McLaughlin, 1995; Martin et al., 2014; Mezirow, 1997). Garet et al.'s (2001) five effective characteristics for professional development, in addition to other research on professional learning practices, provide a foundation for the TTL model (see Table 1).

Implementation Recommendations

TTL promotes collegial collaboration and allows practical application of knowledge and skills in a real classroom setting. In one of the few empirical studies investigating a laboratory approach, Amolins and colleagues (2015) investigated a 10-week summer learning lab professional development approach to science teacher instruction, analyzing data from seven teachers and approximately 300 students. The study found statistically significant increases in teacher use of student-centered learning and improved teacher participant self-efficacy, confidence, and job-satisfaction. While this study was a qualitative study, the themes discovered in our study add additional data to support Amolins and colleagues' findings. While outside the scope of this study, the next step for TTL research involves collecting evidence of student learning, perhaps but less importantly within the summer experience itself, but more importantly across the long-term experience in these teacher participants' classrooms. Further, next steps involve continually to evolve the TTL framework to make it better. Several recommendations emerged from the results of this study for making the TTL experience stronger:

Table 1

Effective Characteristics of Professional Development

Effective Professional Learning	Team Teaching and Learning	TTL Characteristics	Research Foundation
Content Focused	✓	Framework can be applied to any content learning.	Garet et al., 2001
Active Learning	✓	Professional team planning, teaching, and reflection.	Cook & Friend, 1995; Garet et al., 200; Hirsh, 2007; Lieberman & Miller, 2014; Stewart, 2014
Coherence with Other Learning Activities	✓	Professional learning experience occurs in authentic setting with real students and is relevant to classroom learning.	Garet et al., 2001
Collective Participation	✓	Teachers collaboratively plan and co-teach lessons, and observe one another, providing collaborative feedback.	Allen & Penuel, 2015; Darling-Hammond, 2008; Garet et al., 2001; West, 2002
Duration	✓	Extended duration, at least 50 hours of time together, across the summer or school year. Teachers engage in cyclical, reflective peer feedback and participate in guided self-reflection experiences.	Allen & Penuel, 2015; Butler et al., 2004; Darling-Hammond, 2008; Desimone, 2011; Garet et al., 2001; Guskey & Yoon, 2009; Joyce & Showers, 2002

1. **Clarify purpose and expectations.** Include clear expectations for the outcomes of the experience. Participants felt the experience was trying to serve too many purposes: "I feel like, maybe just a clarity of goal. Are we writing a … unit, or are we reflecting on … strategies in our practice? Which one?"

2. **Clarify participant roles.** Ensure participants know their role on the team and discuss how to work collaboratively within the roles. One participant stated, "We had some issues with, well, I'm the coach, so I'm going to sit in the back and evaluate what you're doing. And being like, wait a minute, I thought we were all team teaching."

3. **Appoint an on-site leader, a champion to the cause.** While this version of TTL had a champion, this person was not on-site daily, and participants noticed. One participant stated, "I think, there needs to be someone at the site that's in charge. That was really frustrating not having someone to go to when issues came up."

4. **Work towards team cohesiveness.** Teams can be improved by providing time to bond prior to team teaching and for providing time to collaboratively plan. Consider the benefits of utiliz-

ing a team from the same school or diversifying a team with teachers from various schools or disciplines.

5. **Utilize heterogeneous student groups.** This TTL pilot occurred during a summer school program, so the student group was homogenous with low-achieving students. Numerous participants recommended a more diverse mix of students, especially academically. For instance, one teacher said: "I know we grabbed some pretty low kids, maybe grabbing some of … the medium range, so there's not as many behavior problems. Just so we can kind of get a feel for how it should work."

The authors propose that the first four recommendations be utilized for all purposes of TTL; however, the use of heterogeneous student groups would depend on the specific purpose of that particular TTL.

Conclusion

Participant feedback from the TTL approach to professional learning revealed real change in teacher practice. There was strong professional collaboration and implementation of the professional development content during the summer lab experience, which appeared to be sustained in the following school year, according to participant feedback. TTL incorporates numerous re-

search-based best practices in its format and implementation. It fosters professional collaboration and feedback that promotes instructional reflection. TTL is a model that can be replicated by school districts to make teacher learning more meaningful and sustainable.

Future research can help address the limitations of this study. A future study may examine the impacts of the TTL model on a larger district in a different location or explore the effects on teachers of this approach with various team sizes. Additionally, several logistical concerns that surfaced in this research could be addressed, such as placing participants on teams of teachers they work with during the school year, diversifying the student groupings, and implementing TTL during the school year. Furthermore, analyzing student achievement data can help explore the effects of TTL professional development on student learning as it relates to teacher learning. Future research can explore the TTL strategy in various contexts, such as content teams (i.e., math teachers co-plan and co-teach), implementing co-teaching for ELLs, or training a faculty in instructional coaching.

The Team Teaching and Learning professional development experience can provide consequential practice change in teachers and can lead to improved self-efficacy in educators. In contrast to current research that states that professional development is not meaningful for teachers (i.e., Bill and Melinda Gates, 2014; Wei et al., 2009), this team-teaching experience was rated highly by participants. This professional development model integrates numerous research-based best practices to support adult professional learning, including authentic learning environment, team teaching, and duration. TTL provided teachers with relevant pedagogical content and led to changes in practice. There is great potential for schools to implement TTL as a model professional development opportunity for teachers, where teachers are active participants, providing collegial feedback, collaboration, and reflection that improves learning for all.

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