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Student Teacher and Cooperating Teacher Tensions in a High School Mathematics Teacher Internship: The Case of Luis and Sheri

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We investigate interpersonal difficulties that student teachers and cooperating teachers may experience during the teaching internship by exploring the tension between one high school mathematics student teacher and his cooperating teacher. We identified seven causes of this tension, which included different ideas about what mathematics should be taught, how it should be taught, and a strained personal relationship. We compare these findings with results from interviews with six other student teachers and eight of their mentors to explore the uniqueness of this case. We also offer suggestions for better preparing student teachers and cooperating teachers for the teacher internship.

Keywords: teaching internship • high school mathematics teachers • cooperating teacher • student teacher • mentoring

Research on Internship Experiences

When asked to name the most valuable part of their teacher education, both beginning and experienced teachers commonly cite field experiences, including student teaching (for example, Wilson, Floden, & Ferrini-Mundy, 2002). In the United States, the *teaching internship* (also called *student teaching*) refers to an extended field placement during initial teacher training in which prospective teachers, also called student teachers (STs), assume teaching responsibilities in the classrooms of practising teachers, also called cooperating teachers (CTs). The teaching internship offers STs important opportunities to develop pedagogical and content-specific knowledge (Feiman-Nemser & Buchmann, 1987).

Although there has been notable progress in understanding effective components of mathematics field experiences (for example, Davis & Brown, 2009; Jaworski & Gellert, 2003), much of this research focuses on elementary or middle school teachers. Many of the details of the internship experiences of high school mathematics teachers remain under-researched (Mtetwa & Thompson, 2000; Rhoads, Radu, & Weber, 2011). More research on internship experiences is needed in order to fully understand this critical time in high school teachers' development. Mathematics education researchers have argued that teachers need a robust knowledge of the mathematics they are teaching as well as knowledge of how to convey mathematical ideas to students (for example, Ball, Thames, & Phelps, 2008; Ma, 1999). Although preservice teachers can develop some of the knowledge they need in a university setting, some researchers have hypothesised that teachers develop knowledge about students' mathematical

thinking and mathematical explanations accessible to students only by working in a classroom setting (Noddings, 1992). In addition, teacher educators have emphasised the importance of prospective teachers' beliefs about mathematics and the learning of mathematics (Davis & Brown, 2009; Phillip, 2007). Mathematics educators call for teachers to teach in reform-oriented ways that focus on student learning (for example, National Council of Teachers of Mathematics, 2000), and the teaching internship can be a place where teachers have opportunities to experiment with novel methods of instruction in a classroom setting.

Although the teaching internship sometimes provides prospective teachers with the opportunity to develop the content knowledge and beliefs they will need to become effective teachers, these gains are not always realised. Some STs have reported having negative internship experiences in which they learned little (see, for example, Rhoads et al., 2011), and researchers have also documented STs' lack of growth during the student teaching experience (for example, Borko & Mayfield, 1995). The relationship between ST and CT can have a considerable impact on both the mentoring that occurs in the student teaching experience and the overall experience of both parties (Bradbury & Koballa, 2008; Rhoads et al., 2011). Some researchers have focused on understanding aspects of this relationship (for example, Bradbury & Koballa, 2008; Valencia, Martin, Place, & Grossman, 2009), but there is very little research on ST and mentor relationships in high school mathematics. More research is needed to explore some of the issues behind ST and mentor interactions.

In this paper, we present a case study that describes and interprets the strained relationship between one high school mathematics ST and his CT. The following exploratory questions guided our research:

1. What causes a strained relationship between a high school mathematics student teacher and cooperating teacher?
2. How do the student teacher's and cooperating teacher's beliefs about the internship experience influence their behaviour?

CTs have an important role in the development of STs. Research in mathematics education and general education has indicated ways in which interactions between CTs and STs can shape the internship experience and influence STs' development, and the literature has revealed several common themes. Some of these themes are mathematics specific while others cut across content areas.

Freedom to Experiment with Different Teaching Methods

One of the most fundamental ways in which STs learn to teach is by experimenting with different methods in the classroom. Rhoads et al. (2011) interviewed 11 secondary mathematics STs and found that freedom to experiment with different teaching methods was one factor that led to positive internship experiences. By contrast, when STs were not allowed sufficient freedom, they reported negative internship experiences.

The issue of sufficient freedom in the internship is complicated by several factors. Valencia et al. (2009) interviewed and observed nine English STs and

their CTs. STs reported feeling torn by two opposing forces: (a) the desire to be "respectful guests" in the CTs' classrooms (i.e., take on the norms established by their CTs) and (b) the will to experiment with their own ideas in the classroom. CTs in Valencia et al.'s study also had various ideas about whether STs should be mimicking them or experimenting with different methods, and mismatches in expectations led to missed opportunities for learning in the internship. In addition, the schools and larger governing bodies held CTs accountable for their students' learning and provided strict curricular guidelines. CTs had to balance these responsibilities with allowing the STs freedom in the classroom.

The Role of Feedback

Researchers have also shown that STs across disciplines believe that a key role of CTs is to provide quality feedback on the STs' teaching. Rhoads et al. (2011) found that secondary mathematics STs appreciated frequent feedback that was supportive. However, STs also wanted more than positive feedback: they wanted critical feedback that included specific suggestions for improvement. Personal relationships with their mentors were also important to the STs in Rhoads et al.'s study, and the researchers hypothesised that STs' perceptions of feedback were tied to these relationships. That is, STs who had good relationships with their mentors may have been in a better position to receive constructive feedback.

Different ideas about the role of feedback have also been documented as causing tension between STs and CTs. Bradbury and Koballa (2008) used interviews and observations to explore the tensions between two high school science ST/CT pairs. The two mentors in the study intended to provide specific suggestions to STs at the beginning of the internship and move towards collaborative discussions of teaching with STs by the end of the internship. By contrast, the STs were looking for direct guidance from the CTs about what and how to teach throughout the internship. These different expectations led to conflict. The researchers noted that this conflict was escalated by the fact that the ST/CT pairs had difficult personal relationships and hence did not discuss their expectations and frustrations.

The Lack of Mathematics in Mentoring

In order to learn how to teach mathematics for understanding, STs need to be given opportunities to reflect on their teaching and consider mathematics in novel ways. Under the guidance of CTs, STs may be in an ideal place to develop their teaching-specific knowledge of mathematics.

However, CTs do not necessarily consider STs' mathematical development to be of central importance in the internship. Leatham and Peterson (2010) surveyed 45 secondary mathematics CTs and found that CTs believed the primary purposes of student teaching were for STs to interact with other teachers, spend time in a "real classroom", and develop classroom management skills. Noticeably missing from most surveys were purposes of student teaching related to STs' mathematical development, though the researchers had

specifically prompted teachers to specify mathematics-specific goals. The researchers contrasted the CTs' perceived purposes with a common goal of mathematics educators—specifically the goal that STs understand the craft of mathematics teaching by carefully considering mathematics from a teaching perspective.

Recent research has also suggested that CTs may rarely discuss issues specific to mathematics during their conferences with STs. Fernandez and Erbilgin (2009) followed the mentoring conferences that two middle school mathematics STs held with their CTs. CTs and STs discussed mostly classroom management issues, and the two CTs were *never* recorded discussing mathematics content in their conferences with STs. Borko and Mayfield (1995) also found that middle school mathematics CTs did not challenge STs to think critically about the mathematics behind teaching during their conferences together. As a result, the STs expected very little useful feedback out of the conferences with their mentors.

Peterson, Williams, and Durrant (2005) sought to determine the factors that inhibited secondary mathematics STs and CTs from discussing mathematics-specific ideas. The researchers found that CTs and STs believed that secondary mathematics was straightforward and that classroom management discussions were more important than mathematical discussions. In addition, CTs believed that STs already had the mathematical knowledge they needed to teach, and this was reinforced by the fact that STs were sometimes reluctant to reveal gaps in their mathematical knowledge to their CTs.

Call for the Current Study

The literature described here is focused on characteristics of mentoring that can shape the student teaching experience, for example freedom that is permitted, as well as characteristics that are notably absent from CT/ST interactions, that is, discussion of mathematics. However, only a few studies seek an understanding of the mentoring relationship from the perspectives of both ST and CT, and none of these studies are focused on high school mathematics mentoring. High school teachers often complete a major in mathematics and hence may be more confident (or arrogant) about their mathematical knowledge than elementary or middle-school teachers. Hence, the relationships that high school STs have with their mentors—specifically with regards to mathematics—may be different than those teaching at other grade levels. In order to help promote positive and productive internship experiences for high school mathematics teachers, it is important to study these mentoring relationships.

The Current Study

In this paper, we focus on the teaching internship experience of "Luis" (pseudonym), a ST of secondary mathematics, and his CT, "Sheri" (pseudonym). This study is of interest because Luis was an especially bright student with a very high undergraduate GPA who showed promise as a preservice teacher, and Sheri

was regarded as a good teacher who had positive experiences working with two STs in the past. However, Luis and Sheri each reported having a difficult experience working with one another.

Design and Goals

This study took place at a large public university in the northeastern region of the USA. This university had a five-year program for undergraduate students to obtain certification to teach secondary mathematics. In the first four years of the program, the students completed the coursework for an undergraduate degree in mathematics while taking elective courses in education. These electives included two content courses to deepen students' understanding of high school mathematics, two methods courses that taught teaching techniques, and four general education courses (for example, classroom management, individual and cultural diversity). These students graduated after their fourth year with an undergraduate degree in mathematics and began their teacher internship in the first semester of their fifth year. These internships lasted one semester, and each ST gradually worked up to teaching most (usually four of six) classes in a CT's classroom.

School districts were selected for STs based on where STs would like to teach and the district's propensity to take STs. The districts then assigned CTs for the STs. The CTs were invited to participate in a two-hour meeting at the university as an introduction to the mentoring process. However, not all CTs attended due to their prior commitments and the fact that some were chosen after the meeting was held. In addition, all CTs were provided with a copy of a teacher internship handbook, which included approximately thirty pages of information regarding responsibilities and expectations of the internship. This preparation is typical of other mentor preparation in the USA (Giebelhaus & Bowman, 2002).

At the university in 2009, there were seven STs of secondary mathematics with teacher internships. Near the end of the teacher internships, the STs, their CTs, and their university supervisors (USs), who observed and critiqued the STs seven times during their internship, were invited to meet individually with the first author for an interview. All seven STs agreed to participate. Six CTs and three USs also agreed to participate. The goal of these interviews was to investigate both ST and mentor views of issues that we found important in previous studies, including the flexibility and freedom that STs were allowed in their student teaching, the feedback they received, and the relationships that they had with their mentors. Although we expected the views of STs and their mentors may differ in some cases, the intent of the interviews was not to explore tension in the internship, and we did not expect the tension present between Luis and Sheri.

The Case

The case discussed in this paper occurred in a suburban school district, where Luis taught three classes. He taught two pre-calculus courses (to mostly 11th and

12th grade students) with Sheri, one of his CTs, and one algebra course (to mostly 10th and 11th-grade students) with "Anya", a second CT. His US was "Rhonda", a retired teacher with over thirty years of experience.

Luis. Luis was regarded as an excellent student by most who had contact with him. He was the only ST in mathematics from his university to be nominated for a prestigious statewide award for outstanding student teaching. His undergraduate GPA was 3.9 out of 4.0, which was unusually high for a prospective mathematics teacher. In her interview, Rhonda emphasised that Luis would become "a great teacher", and in her evaluations of Luis, she claimed he had the mathematical knowledge, communication skills, and reflective nature necessary to develop into "a master teacher". Anya declined to be interviewed for this study, but her written evaluations of Luis were overwhelmingly positive. Luis received the highest possible score on his formal, written evaluations from both Anya and Rhonda near the end of his internship. Although Sheri had a difficult relationship with Luis, she acknowledged that he was extremely smart and worked well with individual students. She was also impressed with the way he made himself available to students outside of class.

Sheri. Sheri was a mathematics teacher with 11 years of experience. She used the "alternate route" to obtain her certification, meaning that she received on-the-job training and did not complete an education program from a university. Sheri was asked to work with Luis, in part, because her supervisor regarded her as a good teacher. She worked with two STs in the past and reported that she had very positive experiences with them. Although Luis expressed frustration with Sheri, he claimed she was a "good teacher" and was impressed with her classroom management skills. Rhonda was critical of the other ST who she supervised as well as CTs whom she had worked with in the past; however, Rhonda described Sheri as an ideal CT with whom to work. Sheri did not attend the CT training meeting at the university because, at that time, she was not aware that she would have a ST.

The Data. The data came from multiple sources. The primary data resulted from individual interviews with Luis and Sheri about their internship experiences. These interviews were semi-structured; that is, they were organised around particular questions, but the interviewer explored other issues as they arose in the interviews. In making sense of the experience, we also considered the evaluations of Luis's teaching that were provided separately by Sheri, Rhonda, and Anya, 20 pages of hand-written notes that Sheri provided for Luis during the beginning part of his student teaching experience, and Rhonda's interview.

Rhonda's interview came before those with Luis and Sheri. Interestingly, Rhonda did not discuss the tensions between Luis and Sheri in her interview, which may indicate that she was unaware of the situation. This could be because, from all accounts, both Luis and Sheri had positive relationships with Rhonda, and Rhonda was only present for seven observations during the internship. Indeed, Sheri was aware of, and somewhat frustrated by, the positive opinion that Rhonda held of Luis. She felt Luis taught very well on the days in which Rhonda observed him, but that this was not representative of the way he usually

taught. Nevertheless, Rhonda's interview provided an experienced perspective on Luis's teaching, Sheri's classroom, and the typicality of Luis's internship.

Luis's interview occurred prior to Sheri's, and he openly discussed the tension between them. When first asked to discuss how he worked with Sheri, Luis said, "We have pretty clashing personalities," and then went on to describe specific instances when it was difficult to work with Sheri. The data from Luis's interview were used to generate additional questions for Sheri that were aimed at understanding her relationship with Luis. However, Sheri—unprompted—also reported a great deal of tension between her and Luis, describing that Luis was much more difficult to work with than previous STs.

These initial interviews were fully transcribed, and we used the participants' reports to inductively hypothesise causes of the tension between them. For example, when reporting the difficulties he had working with Sheri, Luis described several specific instances where Sheri had interrupted his teaching. Sheri also described the need to "jump in" to Luis's teaching. Using these accounts, we hypothesised that Sheri's interruptions of Luis's teaching were a cause of tension between the two. The first author discussed these hypotheses with Luis in a follow-up interview and asked Luis to discuss whether he thought the researchers' interpretations were accurate. She also asked Luis to expand on some previously discussed issues that were unclear. This follow-up interview was used to confirm, reject, or refine our previous interpretations. A similar interview with Sheri was unable to be conducted.

In the following section, we present the case of Luis and Sheri organised around the causes of tension in their experience. In order to interpret these, we explored the extent to which they were present in other ST/CT experiences. The remaining thirteen interviews of the other participants in the study were fully transcribed. Each transcript was coded for passages that related to the issues we identified between Luis and Sheri. These were compared and contrasted with Luis and Sheri's experience, and we refer to these general results in the discussion section of this paper.

Causes of Tension

We identified seven causes of tension between Luis and Sheri: (a) different perceptions about freedom in teaching methods, (b) different ideas about mathematical topics that should be taught, (c) Luis's difficulty with time management, (d) Luis's struggle with understanding students' mathematical knowledge and difficulties, (e) Sheri's interruptions of Luis's teaching, (f) different perceptions about the role of feedback, and (g) a strained personal relationship between Luis and Sheri. Although Luis and Sheri generally agreed on the events that transpired (i.e., we did not come across instances where Luis claimed he did something and Sheri claimed he did not, or vice versa), their interpretations of these events were sometimes very different.

Freedom of Teaching Methods

One cause of tension between Luis and Sheri was different perceptions about the freedom that Luis had to teach in the ways that he desired. Sheri claimed to allow Luis freedom to try out new ideas, but from Luis's perspective, this freedom was limited and inconsistent, as we explain below.

Sheri's instruction relied heavily on PowerPoint slides prepared prior to class. She felt that PowerPoint presentations or overhead slides were valuable aids for time management, as she did not have to spend time writing out solutions to problems to be covered. However, Luis did not believe in using PowerPoint to teach, as he explained:

> Luis: [Sheri] definitely loved to use PowerPoint to teach, and she taught everything from PowerPoint, which is good and bad. But I always felt like, in math, PowerPoint's good for organising, but if you're trying to show a problem, you have to, like, show it.

The fact that Luis and Sheri had different philosophies regarding PowerPoint was not necessarily a cause of tension, as Sheri claimed that she did not require Luis (or her past STs) to use PowerPoint:

> Sheri: I said [to Luis], "You have lots of options … We have computers and television sets hooked up to all the computers in every classroom, so you can use PowerPoints in every classroom. You can use the overhead. I have an overhead graphing calculator. I have all this stuff. You can use whatever you want".

Later in the interview, Sheri reinforced the freedom that her STs had:

> Sheri: Some of [the past STs] did PowerPoint; some of them did stuff on overheads. I don't have a preference. I say to them all the time, "Whatever your preference is, you do. I'm not going to force you to do one thing or another. Do what you're comfortable with".

However, Luis felt that Sheri was inflexible because she required that he prepare written documents before a lesson, such as homework solutions that could be displayed to students (for example, by overhead transparency or PowerPoint). Luis explained that he felt constrained by this method of teaching.

> Luis: Sheri allows me freedom in [how to provide] solutions for homework … but again, it's not that much freedom. Because if it were up to me, I feel like I waste class time going over answers. I'd rather assign the odds [problem numbers], which [the answers] are in the back [of the book]. And just … do like maybe two `problems [in class].

By contrast, because Sheri was flexible in the way that she allowed Luis to present content and solutions to homework, she felt that she offered Luis quite a bit of freedom in general.

> Interviewer: In what specific areas do you think you allowed Luis to have flexibility?

> Sheri: Pretty much everything. I pretty much let him do what he wanted to do, and only when I saw this is definitely not working would I say, "You have to change that". I gave him lots of options, lots of suggestions, as far as using the overhead or writing on the board or using the computer or PowerPoint.

Luis remarked that he did not mind a lack of freedom in student teaching per se; as he claimed his other CT was also particular about how he taught, and he had a good relationship with her. Rather, he was annoyed because he believed Sheri to be inconsistent about how much freedom he was allowed to have in the classroom.

> Luis: Sheri was like, "You can have freedom", but later on when she's like trying to take away the freedom, that's what caused the problem.
>
> Interviewer: I see, okay … With Sheri it was kind of confusing, it was like, "I thought I could do this, but I guess I won't"?
>
> Luis: Yeah.

Sheri admitted that she took away some of Luis's freedom because of his issues with time management and the topics that he chose to emphasise, as we describe in the following sections.

Mathematical Topics That Should Receive Emphasis

Sheri described how she suggested which mathematical topics to emphasise before Luis taught a lesson:

> Sheri: We would go through briefly in the book, and I would say, "Okay this topic they need to know. This topic you can touch on, but it's not extremely important. This topic, you have to go really into depth".

However, Luis and Sheri did not agree on the mathematical topics that should be emphasised. Sheri felt that Luis would sometimes spend too much time on high-level ideas that would be useful in calculus, even though students were struggling to understand the basics of pre-calculus.

> Sheri: And he said, "Well they really need this for calculus". And I said, "Okay but we need to make sure they understand pre-calculus before they get to calculus because most of them are never going to take calculus. We're focusing on this year and these topics". … He was always thinking higher. Which is great. I must have said a million times, he would be a great college-level teacher.

Luis also acknowledged that he and Sheri disagreed on the topics that he should emphasise. He described how he focused on ideas that would be useful in students' subsequent mathematics courses:

Interviewer: So, how did you personally decide what to emphasise in a lesson or in a unit?

Luis: I just kind of felt like what was more important, what was more applicable to things that students were going to use again in the future … If they're going to continue studying math, what's more important to concentrate on? For example, I always tried to give them more open-ended questions on quizzes and stuff, especially for extra credit. But then, Sheri would be like, "No, that's a waste of time". And some of the kids liked the questions and they answered them fairly well.

The last excerpt also illustrated Luis's philosophy on the presentation of the mathematics that he was teaching. Not only did Luis want to emphasise different topics from Sheri, but also he wanted to provide students with more opportunities for critical thinking about those topics through open-ended questioning. He reinforced both of these ideas with an example of when he taught the addition of functions:

Luis: I remember I spent like maybe like five to ten minutes the first time I taught about the domain of when you add two different functions, the intersection, why it's not the domain of the one with—the function with—the bigger domain. And all of a sudden she just looks at me, and she's just like, "You're spending way too much time on this". She's like, "You don't need to focus on domain of the composition of functions." And I was like "I should" [laughing].

Interviewer: So why did you think it was important?

Luis: Just because like conceptually what students get from it … For example, they have to add like f of x is x [$f(x) = x$] and g of x is root x [$g(x) = \sqrt{x}$] and they have to add it together. Why the domain is just the positive reals and zero.

Interviewer: Why do you think she thought it wasn't as important?

Luis: I have no idea. I mean maybe she thought that it wasn't appropriate for the level.

As illustrated in the previous excerpts, Sheri felt that some ideas that Luis presented were not appropriate for pre-calculus students. However, there were other topics that Sheri felt were important and Luis did not, as Luis described in an example of synthetic division with complex numbers:

Luis: I remember one time she wanted to show synthetic division with complex numbers, and I didn't because I thought it was too long. And I just thought it was extra time and unnecessary to all the stuff I had to do.

Luis discussed the constraints of time in the previous excerpt. Indeed, time management was a broader cause of tension, as we describe in the following section.

Time Management

Both Luis and Sheri indicated that Luis had difficulty with time management when teaching. Sheri indicated that Luis's poor time management continually frustrated her.

> Sheri: There was never time. He had a very difficult time with time management as well. It was always the bell's ringing and they're running out the door, and he's still talking. And I tried to tell him, "Luis, you've got to keep track of the time, you've got to look at the clock, you've got to kind of wind down".

To a large extent, Sheri believed that Luis's time management difficulties stemmed from Luis's failure to prepare written material for class and his decisions of which topics to emphasise, as we discussed in previous sections. She noted that if Luis prepared his solutions to the homework problems ahead of time, he would not waste time figuring out how to do the problem in front of the class. In her words, covering the homework problems "would take you two minutes instead of ten". She also complained that Luis would spend too long covering mathematics the students should be able to do on their own (for example, simple arithmetic) or high-level skills that the students did not need, but Luis did not spend enough time on important ideas that were new to students.

Luis candidly admitted he had difficulties with time management. In fact, when asked if his time management skills differed from Sheri's, Luis replied, "I would say probably not because I didn't have any time management skills". Although Luis recognised that he was not managing time appropriately, he wanted his students to have a deep understanding of the material he was teaching, and he sometimes felt these two goals conflicted with each other. In a previous section, we described how Luis recognised the need to go over homework quickly, but he also wanted to explain homework solutions in depth for the students. In the following excerpt, Luis described a similar conflict:

> Luis: Maybe that's because I'm too strict in the way I think of a teacher … [I have] an idea of what I want to do, what I want to explain, what I want them to understand, and I kind of feel like if I spent too much time putting together calculators and I don't get it through to them, basically. But, I have to. Classroom management is more important … So, I kind of felt like, all right, I might sacrifice student understanding, but that's enough for them.

Towards the end of his experience, Luis believed he had made progress with this conflict and learned strategies for balancing time management and student understanding. His other CT complimented Luis on his progress in her evaluations. From our interviews, it seemed that Sheri did not recognise Luis's internal struggle with time management. Rather, she was frustrated that Luis did not take her advice, as we discuss later in the results.

Understanding Students' Mathematical Knowledge and Difficulties

Sheri commented that Luis did not have a good grasp of students' mathematical knowledge. This manifested itself in three ways. First, Luis did not have an accurate expectation of students' background knowledge. Luis acknowledged that he sometimes had difficulty "understanding where the kids were coming from" and sometimes assumed they knew more than they did. Second, Luis occasionally could not understand the questions students were asking. Third, he was sometimes unable to explain the content in a way that was understandable to students. Sheri explained:

> Sheri: Luis was very smart. And I think that kind of took away from him being able to present material to the kids in a way that they would be able to understand it.

In other words, Sheri felt Luis's intelligence sometimes worked against him in teaching, as the gap between what he understood and what the students understood was too wide.

Interrupting Lessons

With her previous STs, Sheri stopped attending lessons halfway through the semester, providing the STs with more autonomy in the classroom. However, Sheri claimed that early in the semester when working with Luis, she received complaints from parents of the students that Luis was teaching. This had not happened with previous STs, and Sheri felt she needed to exert more control in her classroom. Sheri noted that she would have to teach the students after Luis left, and she was accountable for their mathematical learning.

> Sheri: My thought was, you know, they're my students; they're the ones that need to be learning. He needs to understand what's going on, and I'm the one who's getting them back, so we have to make sure that everything's in place.

In response to parent complaints, Sheri modified the pace of the curriculum, and she felt obliged to attend Luis's classes and "jump in" to provide guidance when she felt Luis was teaching poorly. Sheri was reluctant to interrupt Luis's classes, as she discussed here:

> Sheri: So, [my supervisor and I] said, you know what, let's try [the modified pace] first, and if it doesn't work, or if it doesn't help, then we're going to have to have me kind of jump in. But I didn't want to undermine anything that [Luis's] saying or have the students kind of look at him like, "Well, you don't know what you're doing and you're not really our teacher anyway." I wanted them to really say, "This is our teacher, we have to pay attention to him, we have to listen to him, and we have to ask him questions." That's why I shouldn't have been in the room, and I haven't been in the past. But there were just too many issues, too many, sometimes mistakes. But he tended to focus on things that they don't really need and not so much things that they did need.

In this excerpt, Sheri claimed that she interrupted Luis's lessons in part because Luis was not emphasising what Sheri believed to be appropriate mathematical ideas. Later in the interview, Sheri claimed she also struggled with "jumping in" when Luis did not understand the students' questions.

> Sheri: He had a very difficult time understanding what the questions were that the kids were asking. They would say, "Can I do this?" or "Does this mean that?" —and he wasn't comprehending what their question was. So he would answer a question that they weren't asking and in turn just confuse them more. And, they would just say, "Okay", and they would just drop it. And then I'm like, "Okay, do I jump in and say, 'Okay this is what they're asking and here's the answer to their question'?"

Luis also acknowledged that Sheri would interject during his teaching, and he found it frustrating:

> Luis: I mean there was, like, one day, I'm in the middle of something, and she's like, "Don't spend too much on that, they don't need to know that". So it's kind of annoying when you're in the middle of a lesson and you have to change it.

Luis realised that Sheri tended to interrupt his lessons when he was not emphasising the topics that she deemed appropriate. He found this particularly frustrating because he was confused by what Sheri thought should be emphasised and because Sheri did not understand his reasons for emphasising the topics that he did.

The Role of Feedback

Luis and Sheri had different ideas about the role of feedback in the internship. First, Sheri expected Luis to implement her suggestions, but Luis thought that Sheri's suggestions were optional. He eventually implemented them only to avoid complaints from her. Second, Luis expected Sheri to give consistent feedback throughout the student teaching experience, but Sheri felt that it was appropriate to give less feedback towards the end of the experience. We explain these perceptions below.

In the beginning of the semester, Sheri provided Luis with detailed verbal and written feedback. Sheri found that Luis always took feedback well but often did not implement her suggestions.

> Sheri: He was definitely harder on himself than I was on him. But I feel like he didn't do anything to correct it. Or, if he did, it took a really long time to get there.

When Luis reflected on his student teaching experience, he acknowledged what he labelled as being “stubborn" and "not looking for other resources to find new ways to teach":

> Luis: I kind of felt like I could have tried different things. I was kind of stubborn in a way, let's put it that way … I kind of wanted to do things my way. I didn't look for any outside resources to help me teach any specific things.

Over time, Sheri became frustrated with Luis's failure to implement the feedback she gave him. She described the feedback she was giving as "a lot of pushing". Sheri felt that Luis's difficulties with time management in particular could be solved with her suggestions about preparing PowerPoint slides prior to class, so she began to be more forceful.

> Sheri: STs have to learn on their own, you can't tell them, "Okay, do this, do that". It wasn't until it definitely wasn't working that I was like, "Okay you *have* to do this" [italics were Sheri's emphasis].

Sheri described an instance when Luis followed her advice (about using PowerPoint to display homework solutions):

> Sheri: He finally did it. He said, "This helps a lot. It's much easier". And I said, "See, I know what I'm talking about. I'm telling you for a reason, to help you". I kind of felt like he didn't want to go above and beyond, to do the extra work for himself. Which, in the end, created more work for him without realising, and it wasn't until the end where he did all of his own things and he finally took my advice and did what I suggested, that he said, "Yeah, you're right. This does make it easier". Where the [past STs], when I'd make a suggestion, they took it, and they said, "Yeah, this is great".

The excerpt above indicates that Sheri felt somewhat vindicated with Luis's decision to implement her feedback.

It is unclear from our data (a) whether Luis's comment that Sheri's methods "helped a lot" was genuine, and (b) in what aspect of teaching Luis found PowerPoint to be helpful. What is clear is that Luis claimed to have found a solution that minimised Sheri's complaints: reviewing his lesson plans with Sheri before he taught, as he described:

> Luis: We had, really, a lot of trouble in the beginning. It was more so we were going back and saying, "Okay, you should have done this, you should have done this", after I taught it, as opposed to, "Okay, why don't I just go to her first?"… That way we don't have to fight about it afterwards.

As the semester progressed, Sheri offered less feedback to Luis. Luis expressed disappointment with Sheri's lack of feedback.

> Luis: She [provided positive feedback] more so in the beginning, but now it's like barely anything. I feel like she wants me out of there quickly.

Later in the interview, Luis also said that he did not know what to interpret from Sheri's lack of feedback. Sheri's perception about her lack of feedback was

different. She viewed her role as providing strong guidance to her STs in the beginning of the semester and then letting them teach on their own for the remainder of the semester.

> Sheri: For the last month or so that [Luis] was here, even though I was in the room, I let him just do [things] on his own. Every once in a while I would look over and say, "Okay this is what we need to fix". But my other STs were able to just go with it on their own.

Indeed, as discussed in the preceding section, the only reason Sheri attended Luis's classes was because she felt he needed extra help.

A Difficult Personal Relationship

Both Luis and Sheri acknowledged that they had a difficult personal relationship, although each claimed not to dislike the other personally. Sheri explained that she had closer relationships with her other two STs.

> Sheri: When you have more of that personal relationship or that friendship, more vulnerability, and they don't have as much of a fear opening up and showing that. And I think it's almost easier to help them when they do open up like that. I felt like, and it might be more of that male/female relationship where he's afraid to show me that he had faults or that he was afraid of something or that he didn't understand something. I felt like he wanted to show that he was really smart and he knew what he was doing and he could do it. Where the [past STs], they kind of came in, in the beginning with, "I have no idea what I'm doing, I'm terrified, help me".

Sheri felt that the relationships she had with her other STs were due, in part, to their "vulnerability", which she believed that Luis lacked. However, Luis believed that the difficult relationship between him and Sheri was simply due to "clashing personalities". Several times during the interview, Luis mentioned that Sheri seemed tired of working with him. Luis may have got this idea from Sheri's lack of feedback towards the end of the experience.

General Discussion

In the previous section, we described seven sources of tension between Luis and Sheri. In this section, we discuss (a) the extent to which issues raised by Sheri and Luis were present in other intern/mentor relationships in our larger study; and (b) how our findings build on the existing literature on mentoring relationships. In so doing, we identify both general aspects of CT/ST interactions and the uniqueness of Luis and Sheri's case, and we offer suggestions for preparing STs and CTs for the internship experience.

Freedom and Flexibility

Rhoads et al. (2011) reported that STs valued freedom to experiment with different teaching methods, and a lack of freedom sometimes led to negative internship experiences. In our larger study, one other ST reported that a lack of freedom led to tension in the experience. The remaining five STs either were allowed sufficient freedom (from their perspective) or adopted the CTs' methods. Some STs adopted the CTs' methods eagerly, and others were acting as "respectful guests" in the CTs' classrooms (Valencia et al., 2009). Nonetheless, in the other ST/CT pairs, we did not perceive the kind of tension that Luis and Sheri expressed. The tension between Luis and Sheri regarding freedom stemmed from Luis and Sheri's different ideas about what constituted freedom and Luis's perceived inconsistency in the amount of freedom he was allowed. Moreover, Luis was "stubborn", and because he believed that he had freedom in Sheri's classroom, he was not content with adopting her methods.

Luis's case, as well as our data from interviews with CTs and USs, extends our understanding of two factors that may contribute to STs' perceived lack of freedom in the classroom. First, CTs may allow STs considerably less freedom than they realise. This is a point we did not find mentioned in previous literature. Sheri believed that she allowed Luis freedom in "pretty much everything", yet she was particular about what mathematical topics he emphasised and insistent that he use slides prepared ahead of time to present his material. Second, accountability constraints may limit the teaching flexibility that CTs can allow pragmatically, a point that echoes Valencia et al. (2009). Three CTs and two USs in our larger study pointed out that CTs were ultimately responsible for students' learning, so they could not allow STs complete freedom in the classroom.

Luis's supervisor, Rhonda, discussed why some CTs do not allow their STs freedom in their teaching.

> Rhonda: They're looking for someone to clone their style. And don't forget they're going to get these students back again, and they want those students in the form that they want them to be, with the behaviours and the habits of the mind that they want.

Rhonda noted that CTs are ultimately responsible for the education of their students and want their students to be conditioned to learning when they return as the classroom teacher. We noted that Sheri was stricter with Luis after she received complaints from parents about his teaching, in part because she was responsible for these students' learning.

We believe it is important that CTs recognise that they may allow STs less freedom than they realise, and it may be helpful for CTs to discuss with STs the reasons why this freedom is limited, such as the reasons that Rhonda cited. Of course, these discussions require a positive relationship between CT and ST— a point we discuss later.

Common Difficulties and Goals of Student Teaching

The abilities to manage time effectively and understand students' mathematical thinking are widely acknowledged to be critical for successful teaching. Luis had difficulty with both of these issues. However, in this sense, Luis was not unique. Indeed, all seven STs reported having difficulty with these aspects of teaching, with five of the seven citing learning how to manage time and better understanding students' mathematical thinking as some of the most valuable benefits they obtained from their student teaching experience.

What appears different about the case study reported here was how Sheri interpreted Luis's deficiencies in these regards. All nine mentors in our study recognised that their teacher interns had difficulty with time management and understanding students' mathematical thinking, but only Sheri found this to be problematic. The remaining eight mentors thought these two issues were the norm, and they did not expect them to be completely resolved at the end of the internship. In fact, one US referred to these difficulties as common "new teacher traps", and one CT said these teaching skills were "secondary to knowing your content". Sheri acknowledged that Luis knew mathematics content well, but she viewed his lack of time management and inability to interpret student thinking as serious faults. These were some factors that led to her "jumping in" while Luis was teaching.

CTs in Leatham and Peterson's (2010) study identified managing a classroom (including time management) as a primary goal of student teaching and interacting with students (including interpreting students' thinking) as additionally important. Although many CTs may agree that learning to manage time and understanding students' comments and questions are two main goals of the internship, our data indicate that CTs may have different expectations about the extent to which these goals will be met completely by the end of the experience and different ideas about the seriousness of meeting these goals.

Common, non-problematic issues that STs face would be worthwhile to discuss in CT training. This would provide mentors with an idea of what to expect of their STs and make STs aware of some of the challenges that they may face.

Mathematical Foci

Existing literature reports that interactions between STs and CTs generally lacked a mathematical focus, and neither STs nor CTs brought mathematics to the forefront of discussions about teaching (Borko & Mayfield, 1995; Fernandez & Erbilgin, 2009). However, in the case presented here, there were plenty of opportunities for Luis and Sheri to discuss mathematics, as they had disagreements about the mathematics that should be emphasised. These opportunities could have been used as a starting point for meaningful discussion about the connections between mathematical topics as well as benefits and drawbacks of emphasising certain topics over others. Unfortunately, our data suggest that Luis and Sheri did not have such meaningful discussions, perhaps

because their beliefs about what was important to emphasise were very different. Luis claimed to make mathematically guided choices in his teaching. For instance, in teaching pre-calculus, Luis claimed he would emphasise ideas that would be useful in calculus. Researchers such as Ma (1999) have indicated that teaching with an eye toward how the mathematics being taught connects to the future mathematics that students will learn may help students to be more successful in mathematics. However, Sheri found this to be a waste of time, essentially arguing that students can learn calculus if and when they take calculus. Luis also mentioned that he would like to engage students in problem-solving activities, but lamented that he did not feel like he was able to do so. Sheri had different mathematical goals. For instance, Sheri wanted Luis to emphasise synthetic division of complex numbers, but it was not clear to Luis what insight students would gain from this topic.

On the one hand, this case emphasises the different goals of various parties in the internship brought to light in Leatham and Peterson's (2010) study. We believe many mathematics educators would appreciate Luis's mathematically focused choices and encourage him to continue thinking deeply about the mathematics he is teaching. Sheri's focus on Luis's time management and her complaints about the mathematics Luis chose to emphasise suggest that Sheri's goals may be more practically focused. As described earlier in this paper, Luis felt an internal struggle between fulfilling the practical demands of teaching and facilitating students' mathematical development, which may be fuelled by the conflicting messages he is receiving from his teacher education program and his CT.

On the other hand, Sheri's practical concerns do have a mathematical essence. As we described earlier, Sheri explained that she felt Luis did not understand students' mathematical questions and confusions. Sheri did value the mathematical thoughtfulness Luis brought to the experience, saying, "He's always thinking higher. Which is great". However, researchers such as Ball et al. (2008) note that understanding students' mathematical thinking is an important part of learning to teach. It was this understanding of students' thinking and their mathematical level that Sheri felt Luis was missing, saying, "Luis was very smart. And I think that kind of took away from him being able to present material to the kids in a way that they would be able to understand it".

Although differing viewpoints about the goals and important aspects of student teaching can never be eliminated completely, more open communication among teacher educators, CTs, and STs can help lead to mutual understanding of, and respect for, different goals. We recognise, however, that this communication is not straightforward and would require careful preparation of STs and their mentors.

We should note that no other ST/CT pairs reported conflicts over which mathematical topics to emphasise. All STs that we interviewed mentioned that their CTs would help them decide which mathematical topics to emphasise when planning a lesson or a unit. All STs except Luis appreciated this guidance because they felt inexperienced in this regard (c.f. Bradbury & Koballa, 2008). Luis was a

special case. Perhaps this was because he was, in his words, "stubborn" and had "strict ideas about what a teacher should be".

Personal Relationship and the Role of Feedback

Rhoads et al. (2011) reported the importance that STs placed on a personal relationship with their mentors, and Bradbury and Koballa (2008) illustrated the tension that can occur and communication that can be hindered when the relationship between ST and CT is strained. Our interviews with STs and CTs in the larger study overwhelmingly indicated how important the ST/CT personal relationships were to the overall internship experience, not only for STs but also for CTs. It was common for STs who reported positive experiences with their mentors to refer to them as friends, and vice versa. Luis and Sheri's case also emphasises the importance of positive personal relationships between CT and ST. Sheri believed having a friendly personal relationship was important and believed such a relationship contributed to her positive experiences with previous STs. Similarly, Luis had a closer relationship with his other CT and claimed to have a better experience with her. However, the personal relationship between Luis and Sheri was clearly strained.

Our data do not say definitively whether the strained relationship between Luis and Sheri was a cause of the other tensions that they experienced or a *consequence* of these tensions. However, in the spirit of Bradbury and Koballa (2008), we noticed that the difficult personal relationship between Luis and Sheri was tied to their different expectations about feedback. Specifically, we hypothesise that the negative relationship between this pair was due to different ideas about how much of Sheri's advice Luis was expected to implement. In our (non-research-based) experience with teaching internships, CTs sometimes complain that the STs do not follow their advice and attribute this to STs' arrogance. CTs may feel insulted that the STs were apparently not respectful of their experience and expertise. We noticed some of these characteristics in Luis and Sheri's accounts of their relationship. For instance, when discussing the role of feedback, Luis commented that he could be stubborn and not seek outside counsel for his lessons, and Sheri expressed frustration that Luis would not take her advice, telling him, "See. I know what I'm talking about. I'm telling you for a reason". Sheri claimed that Luis was reluctant to open up to her: "I felt like he wanted to show that he was really smart and he knew what he was doing and he could do it". One implication of this hypothesis is that for some CTs, a failure to heed their advice might not be interpreted as a difference of teaching styles, personalities, or opinions, but rather as a lack of respect. This interpretation could sour the relationship between the two. STs and CTs who approach the internship experience ready and willing to learn from each other may have a more healthy relationship and hence a more productive internship.

Conclusion

The case of Luis and Sheri and the tensions that arose during their interactions offer some points of consideration for high school teacher internships. It is common for prospective high school mathematics teachers to major in mathematics, and most prospective high school teachers are confident in their mathematical abilities, especially regarding high school content. Luis was an excellent undergraduate mathematics student who thought critically about mathematical ideas central to secondary mathematics. This kind of confidence and knowledge may be intimidating for CTs, who may feel they are expected to be more mathematically knowledgeable than their STs. This may be particularly true in a case like Luis and Sheri, where Luis was responsible for teaching pre-calculus, an advanced high school course. In addition, when STs are reluctant to try CTs' pedagogical suggestions, CTs may feel that STs are disrespectful of their classroom expertise. Hence, we believe it is important for prospective STs and CTs to discuss common issues that can arise during the internship and ways to communicate openly about philosophies of teaching and philosophies of mentoring. Most importantly, CTs and STs can be encouraged to approach the internship with mutual respect, open minds, and a willingness to learn from their colleagues.

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