Praising and correcting: prospective teachers investigate their teacherly talk

Sandra Crespo*

Michigan State University, 116P Erickson Hall, East Lansing, MI 48824-1034, USA

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Abstract

Despite recent calls for teachers to promote and increase students’ communication and discussion in their classrooms, prospective teachers have limited opportunities to explore issues of classroom talk during their teacher preparation programs. In this study, prospective teachers attending a mathematics methods course were encouraged to attend to and investigate their developing teacherly talk through a letter writing exchange with school students. This paper reports on their tendency to respond to the correct answers with praise and to supply the answers when students reached an incorrect result. It explores the ways in which they began to interrogate and problematize such practices and to consider alternative forms of teacher responses to students’ right and wrong answers. Features of the course’s field-related experience and the teacher educators’ interventions that promoted and supported the preservice teachers’ investigations are also discussed. © 2002 Elsevier Science Ltd. All rights reserved.

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1. Introduction

The prominent role that classroom discourse plays in shaping students’ beliefs and understandings of subject matter has been widely documented and accepted in the education community (e.g., National Council of Teachers of Mathematics [NCTM] 1991, 1989). The way ideas are exchanged in the classroom are known to send overt and covert messages to students about the norms of thinking and knowing that are accepted and valued. Classroom interactions have, therefore, become an important feature of educational reform efforts. In such reform-oriented classrooms, teachers play a vital role in promoting and sustaining students’ discourse. Rather than simply telling and validating answers for students, reform-minded teachers would work towards promoting an environment where students share, discuss, and debate the reasonableness and validity of their ideas.

Traditional modes of instructional interactions between students and teachers, however, seem stubbornly resistant to change. Examples of teachers’ interventions which hinder and limit students’ own sense making abound in the research literature (see Edwards & Mercer, 1987;
Pimm, 1987). Yet, such ineffective patterns of interaction still pervade today’s classrooms. Ball (1991) illustrates with a familiar example:

Consider the way in which right answers are treated in a mathematics class. Suppose students are solving the problem “What is two thirds of nine?” and a student gives the answer, “Six”. The teacherly reflex is to hear it as a “right answer” and to (a) move on; (b) praise the student; or (c) agree and repeat the answer for the benefit of the rest of the class (p. 44).

Such teacher responses, researchers have pointed out, have served to promote debilitating myths about knowing and doing mathematics (e.g., Borasi, 1990; Schoenfeld, 1991; Tobias, 1993). They have pointed out that students who consistently participate in such classroom discourse come to believe that “learning mathematics is a straightforward matter”, that “staying too long on a problem is a waste of time”, and that “making mistakes is an embarrassment rather than an opportunity for learning” (Borasi, 1990). The teaching practices advocated by the reform documents would, in contrast, see the teacher asking the above student to explain and justify the answer, regardless of its correctness. In this way the focus and the point of class discussion is not solely on reporting correct answers but on exploring mathematical ideas and evaluating their validity based on evidence rather than on the teacher or textbook authority.

Incorporating less traditional patterns of discourse into one’s teaching, however, is not as simple as many would like to believe. Experienced teachers and teacher educators have often found themselves enacting the very same practices they have come to understand as ineffective and miseducative (see Heaton, 2000; Romagnano, 1994). Traditional modes of teacher discourse, therefore, are very persistent and likely to remain unchanged unless they are purposefully examined. Ball (1991) explains:

Even disposed to ask students to explain their answers, the teacher may ask, “How do you know that?” In listening to myself in my own classroom, I realized that using the word know seems to imply that the student’s answer is right. I heard myself saying, “How do you know?” when I agreed with what the student said and asking, “Why do you think so?” or “How did you get that?” when I did not (pp. 44–45).

Prospective teachers are also faced with the challenge of dealing with increased communication in the classroom, as they become enculturated into different ways of thinking about teaching in their teacher preparation programs. This challenge is compounded by their experiences as students in classrooms where the teacher does most of the talking. Studies of teacher socialization have long reported that prospective teachers’ past classroom experiences, more often than not, help them develop implicit and imitative pedagogical tendencies, such as habits of correcting, telling, and supplying the answers (Feiman-Nemser, 1983). Prospective teachers, therefore, enter teacher preparation programs with implicit views on what teachers do and say in the classroom that may prevent them from adopting a more open and exploratory type of classroom discourse. Helping prospective teachers attend to, recognize, and interrogate the messages embedded in their teacherly talk is, therefore, an ambitious yet necessary goal for teacher educators. The question addressed in this paper is:

How do prospective teachers investigate and problematize their developing teacherly talk when offered such an opportunity during a mathematics methods course?

2. Opportunity to investigate teacher talk

Preservice teachers in this study had the opportunity to explore their teacherly talk during their mathematics curriculum and instruction course. This is one of the required “methods” courses in their program. They were attending the two-year elementary teacher education program in a large Canadian university. This program offers a combination of university-based courses and school-based practica. The typical sequence of this program consists of: (1) foundational courses in
education, (2) seven concurrent methods courses in all subject areas (including Mathematics, Language Arts, Social Studies, Science, Art, Music, and Physical Education), (3) a 13-week student teaching experience, and (4) courses related to the social context of schooling and a chosen subject-area specialization. Typically there are no long-term school-based experiences scheduled concurrently or connected with the university-based courses. There is a 2-week teaching practicum scheduled midway during the methods courses in the second semester. However, this school experience is not associated with any of the methods courses. Instead, it is meant to familiarize the prospective teachers with their collaborating teacher’s classroom and help them attend to general issues of classroom teaching.

Typically, teacher candidates are admitted into this teacher education program having completed, or being in the process of completing, a bachelor’s degree in an area related to an elementary school subject. For elementary prospective teachers, these degrees tend to be in the humanities (e.g., Anthropology, English, Psychology, etc). No participant in this study, for instance, had a background in mathematics or science. There is only one mathematics course required for entry to the program and as a pre-requisite to the mathematics methods course. Many choose to take Math 335, which is a course designed for elementary teacher candidates and offered by the Mathematics Department. This course is generally designed as an inquiry-oriented course aimed at engaging students in the process of doing mathematics—solving, proving, conjecturing. It is also taught isolated from pedagogical concerns. For most prospective teachers in the program, and for those in this study as well, the student teaching experience is their first opportunity to interact systematically with students and to attempt to teach in a subject area.

Preservice teachers’ opportunities to investigate issues of classroom discourse tend to be limited during the on-campus experiences offered in this teacher preparation program. Teacher educators, therefore, tend to rely on classroom videos and written accounts (or teaching cases) to illustrate and analyze teaching practices and discourse.

Interactive experiences between prospective teachers and students are often postponed until the student-teaching experience. This may be because such interactive experiences are much more difficult to arrange for 30 or so teacher candidates in the context of a course. It may also be due to the fact that many programs like the one reported here are “jam-packed” with courses and leave little time to incorporate long-term experiences in the classrooms. Therefore when field-related experiences are incorporated into pedagogical courses, they often take the form of one-time encounters with school students, such as conducting an interview or a mini-lesson. In order to provide an interactive experience with the same students that spanned the duration of my course, I incorporated a math letter exchange between my elementary prospective teachers and Eileen Phillip’s (my collaborating teacher) fourth graders. In contrast to the other types of experiences mentioned, a math letter exchange provided a context for my prospective teachers to investigate their own views and practices over a sustained period of time with the same students.

3. More details on the course and the study

The letter writing and reading project was an integral part of the mathematics teacher education course I was teaching in collaboration with two colleagues (Cynthia Nicol, Ann Anderson). We designed the course so that part of the class (20) would work on the letter writing project I had designed (see Crespo, 1998, 2000), while the other group (14) would engage in pair-teaching sessions with Grade 6/7 students on Nicol’s (1997, 1999) “Collaborative Inquiry” project. Both projects spanned the length of the methods course (11 weeks) and took place during one of our two 1.5-h meetings each week. In addition, they required the preservice teachers to make weekly journal entries about their deliberations and reflections raised by their interactions with students. At the end of the course they were asked to write case studies of their learning experiences in their respective projects.

The two projects were described in the course’s syllabus and were introduced and received with
excitement on the second day of class. On that day, we spent the first portion of the class modeling a live small group teaching session that focused on exploring students’ thinking. We invited four fifth graders into our class (with teachers’ and parents’ consent) and we (the instructors) talked with them about their ideas about fractions while our preservice teachers observed. We then asked the fifth graders to work on a problem the adult students had been assigned for homework. Once the young students had left we discussed the highlights of the experience. This class was meant to set the stage for the course’s theme of inquiry on mathematics and teaching, as well as to create curiosity and interest in the idea of working closely with students as a way to learn about teaching and learning mathematics.

We supported our preservice teachers’ investigations in numerous ways throughout the course. They read several articles related to teachers’ discourse and questioning. They also had several opportunities during regular classes and their respective project classes to share and discuss their observations and insights from their work with young students. Each week and during the project day’s class, for instance, they wrote and read their letters within groups of four. This arrangement was meant to provide opportunities for sharing and collaborating on the analysis of their students’ mathematical work and their response letters. The preservice teachers also kept weekly journals that the instructors read and responded to every week. In these journals, they were encouraged to write about the deliberations, questions, and puzzles they had experienced when working with students.

The letter exchanges of 13 volunteering prospective teachers and their assigned Grade 4 students were the main sources of data used to address the question stated earlier. Their letter exchanges (ml) were used to uncover patterns in their developing teacherly discourse throughout the course. Their reflective journal (MJ) entries associated with particular letter exchanges as well as a case report (CR) submitted at the end of the term, were used to examine the ways in which these preservice teachers began to recognize, interrogate, and address the messages embedded in their teacher talk. Special attention is paid here to the written discourse associated with their students’ correct and incorrect work.

4. Prospective teachers’ typical teacherly talk

Close examination of the first two letter exchanges revealed that the preservice teachers’ initial responses to their students’ work had a close resemblance to the “teacherly reflex” type of responses alluded to earlier. Their responses tended to focus on the product and accuracy of the students’ work and they seemed rushed and reactive rather than deliberately constructed. To put it simply, correct answers were praised and incorrect ones were corrected. Miriam’s and Megan’s first responses to their students’ work serve to illustrate this pattern. Miriam responded to her student’s incorrect answer as follows: “I am glad you tried the problem that I gave about horses. Many people in my class had the same answer as you, but the answer should be $20. Here is how I did it...” (ml2). In contrast, Megan’s response to her student’s correct answer read:

Hooray, you got the correct answer to the horse problem. Did you know that some people in my class at university got the wrong answer? Could you tell me if that 120 was your first answer or if you had a different number at first? (Megan, ml2).

These two responses, while well intentioned and good-natured, are quite problematic. Research on teacher praise, for instance, has long discussed its potential negative effects on students’ performance (see Brophy, 1979). For its supporters, teacher praise is considered to be a valuable form of reinforcement of student conduct and performance. Those who support it claim that praise provides encouragement to students, helps build self-esteem, and helps build a close teacher-student relationship. Those with the opposing view, however, contend that learning is intrinsically rewarding and learners should not be bribed or coerced to learn. Others oppose praise because it implies differential status, that is “the person distributing praise takes the role of expert or
authority figure who is judging the behavior of the person being praised” (Brophy, 1979, p. 5). Furthermore, research studies have found that teachers do not praise deliberately but rather it is a spontaneous reaction to students’ behavior and to their subtle demands for praise. This means that the benefits attributed to teacher praise are seldom realized in classrooms where teachers are not fully aware of its hidden messages and proper usage.

In their comparative study of Asian and American classrooms, Stevenson and Stigler (1992) reported that “the most frequent form of evaluation used by American teachers was praise, a technique that is rarely used in either Taiwan or Japan” (p. 191). They found that the practice of praising tended to cut off discussion and to encourage students to be satisfied with their performance without informing them about where they needed improvement. In Asian classrooms they found that students were likely to be asked to explain their answers, while other children were called upon to evaluate their correctness. These contrasting practices, they claimed, were evidence of Asian and American teachers’ differing beliefs about the role of teachers, students, and the sources of knowledge within the classroom.

More recently, Schwartz (1996) has pointed out that “praise intended to support children’s self-valuing does not necessarily serve the development of academic autonomy and the empowerment of children as thinkers and doers” (p. 397). In fact, Schwartz further states that comments such as “good job”, “good thinking”, “beautiful”, “lovely”, and “nice” often seem to achieve the opposite effect. In mathematics classrooms, in particular, praising students for getting the correct answers is potentially more harmful than in other subject areas. Consider for instance that the mathematical tasks commonly used in classrooms have a single correct answer (though there might be multiple solution strategies), which is verifiable by the student who solved the task. Checking one’s work and understanding why one’s results are correct are important mathematical lessons for students. As alternatives to using praise when responding to students’ work, Schwartz suggests the teacher might respond instead with questions that encourage students to revisit their work, that extend the experience, and that invite further explorations.

Based on the above discussion about praise, it is not hard to see that choosing when and where to use verbal praise is not a simple teacher decision. Yet this has not been an area of attention in preservice teacher education. In fact, this was not an explicit focus of our course. However, it is not surprising (in retrospect) that praising was the most common form of response the preservice teachers in this study gave to their students’ correct work. Although not all praise was as exuberant as Megan’s earlier reported response was, it nevertheless carried the same message about the value of the correct answers. Early responses to their students’ correct answers often read: “Way to go on getting the right answer” (Nilsa); “You did a really good job with the marble question” (Sally); “Glad you figured out the problem I sent you” (Linda). As these responses suggest, our preservice teachers seemed unaware of the effect these kinds of responses could have and were having on their students. Some fourth graders, for example, began to conclude their work by asking: “Am I right?”, or with an apology when they felt they might be wrong: “I’m sorry if this one’s wrong”.

To summarize, the initial responses that preservice teachers in this study gave to their students’ correct and incorrect work tended to focus on the product, not the process of the students’ thinking. Their responses were characterized by the exclusive use of praise when the students’ work was right and by the supply of the correct answer when the students’ work was judged to be wrong. This limited repertoire of responses to students’ mathematical utterances and work seriously undermines the reform-minded visions of classrooms as environments that promote risk-taking and sense making. Such responses send implicit messages about the importance of correct answers and, by omission, about the irrelevance of the solution process. An important feature of such responses is that both—praising and correcting—tend to prematurely close or terminate the mathematical conversation without further extending the student’s learning experience. Furthermore, with such responses the preservice teachers were
inadvertently taking away from the students the responsibility for determining which answers are right and which ones are wrong. In other words, both responses serve to undermine the students’ mathematical autonomy and sense making by taking the decision about the correctness of their work away from them. According to Wassermann (1991) such teacher responses are likely to remain unexamined and unchanged unless one develops a disposition for “self-scrutiny” and the “willingness to listen to oneself in an open, honest, non-defensive way” (p. 259).

5. Responding with more than praise

An examination of their later interactions with students (last three exchanges) showed that there were some interesting developments in the preservice teachers’ responses to students’ correct answers. Although their praising responses did not subside throughout their letter exchanges, their later praises had a slightly different character. A noticeable change, for instance, was their use of more deliberate praise to indicate to their students that they valued and expected to see the work that had produced the final correct answer. Later response letters, for example, revealed that our preservice teachers were giving more specific and explicit feedback to their students for providing explanations for, and not just reaching, a correct result. Some examples include: “You did a fantastic job ... I find your explanations very easy to follow” (Terry); “I am very impressed ... it shows me in detail how you got your answers” (Megan); “Your drawings were wonderful! I could really follow what you guys were thinking! Great answers” (Nilsa). These kinds of responses were quite different from the reactive use of praise reported earlier and instead seemed more aligned with Brophy’s (1979) call for specific, purposeful, and unambiguous usage of praise.

Such extensions to their praising patterns suggest that these preservice teachers were broadening their views and usage of praise to encourage their students to explain and justify their answers. This is also apparent in some of their letters, such as Linda’s below, where they made explicit to the students their reasons for valuing their explanations and clear work in a solution to a mathematical problem.

You did a very good job of explaining your answers. It really helps me to see this because it shows me how you think. It also helps me to see why you might be having problems or where you might be missing part of the question, and then, I can ask you more questions. (Linda, ml3)

Another interesting change in their responses to students’ correct answers was observed when the preservice teachers began to incorporate requests for their students to show evidence that their answers were right. Here are a few examples: “You did very well ..., but how did you work through (the problems)” (Carly); “You didn’t show me how you did it” (Rosa); “You got the right answer but I would have liked to see how you found the answer” (Thea). Such additions to their responses make it clear that these preservice teachers were becoming interested in more than the product and accuracy of the students’ answers and that they were expanding their repertoire of responses. They were becoming more deliberate and thoughtful about their feedback to students’ right answers.

Another important change occurred when the preservice teachers began to respond to students’ correct work with further extensions and questions about the problems that the students had just completed. These were very different from their initial tendencies to praise and move on to the next math problem. Instead, these were more like the empowering types of responses Schwartz (1996) advocated as alternatives to praising. One preservice teacher (Terry), for example, responded to her student’s correct answer and explanation of her solution process by also sharing her own answer and solution strategy to point out that there were different answers and solution strategies for that particular problem. Similarly, Carly also attempted to extend her student’s thinking when she responded by asking: “is there a way that you can think of that we could test to see if your answer is right?” Another example is found in Linda’s response to her student’s work: “You did
good with the growing squares problem. Did you notice any sort of pattern in the answers?”

6. Problematizing praise

The reported subtle changes in the preservice teachers’ responses to students’ right answers—from a focus on the product of the students’ work to a focus on the process and explanations for their answers—were mainly implicit in their interactions with students rather than explicitly articulated in their journals. There was, however, evidence in their journals indicating that, often, there were very conscious and deliberate attempts to make such changes to their discourse. “I wished I had asked him how he did this but I forgot to”, wrote Carly in her journal (MJ3). Similarly, after Sally realized that she had no idea how her student had reached the answer to a problem she had posed, she lamented not having asked the student to further explain her solution.

It is also important to note that the practice of praising the students’ correctness remained, for the most part, unproblematic for the majority of the preservice teachers in this study. This is apparent in the fact that all of them continued to use praise as a common response to their students’ correct, clear work and explanations throughout their letters (though many also embellished their praises with more exploratory-oriented responses as was indicated earlier). Furthermore, praising was not among the issues many chose to discuss in their journals. Unfortunately, this also meant that we, the instructors, remained unaware of this practice and therefore did not problematize it either. It was only by looking at the written letters at the time of analysis that I became aware of this pattern in the preservice teachers’ responses.

Only three of the thirteen preservice teachers in this study chose to make problematic the practice of praising and then only upon revisiting and writing about their experiences with students in their final case report. These three openly and explicitly questioned their responses and the hidden messages these carried or may have given to the students. For Carly, her tendency to praise became problematic when she examined her questioning and responding practices with a focus on whether these had encouraged her students “to become critical, independent thinkers”. (CR: p. 4). She noticed a difference between her later and earlier responses to her student’s correct work. She noted that in response to her student’s last correct answer, she wrote: “For the ice cream problem I got the same answer as you. How did you figure it out?” (ml6). Carly realized that such a response sent a different kind of message about the right answer than most of her previous responses did.

My final response was not whether it was right or wrong but that I had found the same answer as her for the problem. By doing this I am agreeing with her but I am also suggesting that though this is an answer that it may not be the “right” or only answer. This stresses that there may be more than one solution or way of doing a problem. (Carly, CR: p. 9)

Megan (who was highlighted earlier) and Linda also reflected on the issue of praising students’ work but in the context of comparing their responses to two students who exhibited different mathematical interests and abilities. Both preservice teachers were corresponding not with one but with two students, a boy and a girl. Megan and Linda each realized that they had inadvertently responded quite differently to the two students. They noticed that they had used more positive feedback and encouragement with the more able student while they neglected to praise the less able student even when he or she had done the work correctly. This is how Megan explained it in her case report:

When I was (reviewing) my responses to the students’ second letter I was quite shocked at the difference in the tone of my voice. Jake and Mary both received the correct answer to the problem I gave them, but I was more enthusiastic in Jake’s letter in which he had the correct answer. For instance, the response Jake received, “Hooray, you got the correct answer to the horse question. Did you know that some people in my class at University got the wrong answer?” (Letter, Jan, 20). In contrast to Mary’s letter: “Your answer to the horse
problem is correct, but next time could you please show me how you solved the problem”.

The difference in the tone of my voice did not stop with the above response. Another example in the same letter, I asked both of the students the same question but in a different way. For instance, in the letter to Jake, “I can tell you like math, but could you tell me what type of math you are doing right now in your class?” In contrast, the letter to Mary, “I was wondering what you are learning in math right now, and if you find it difficult or easy”. The difference in the two above statements are: Mary’s letter has an undertone that she might find math difficult, whereas Jake’s letter has an undertone that he is good at math and finds it easy. (Megan, CR: pp. 4–5)

Having noticed such differences Megan and Linda then explored how their responses could have affected their students’ mathematical work. Megan, for example, speculated that “my under-toning messages could have been the reason why Jake gave me more detailed answers, as he would be praised for the work which he completed”. In contrast, Megan continued, “Mary did not receive the same amount of positive feedback when she completed the math questions, as a result she may have not found it important to show me all of her work” (CR: p. 9). Megan and Linda also pondered about the effect of such responses to students in an actual classroom where such differential feedback is given in public.

For a few of the participants, praising became problematic in the context of responding to their student’s incorrect answers. Preservice teachers whose students were getting wrong answers soon started to praise them for their effort. Here are a few examples: “Good try, you got half of the answer correct” (Megan); “Your answer was really, really close. You only had 3 wrong. This was an excellent try”. (Susan); “You did very well on the times tables I sent you. You got ten out of twelve right” (Mitch). For Linda, the troubles with these kinds of responses became apparent when in her 4th and 5th letter she resorted to praising her student’s incorrect work fully aware that he had not even completed the tasks she had posed. Afterwards, Linda wrote in her journal about her response and questioned what she had done.

When I wrote back, I congratulated him on the good work and left it at that—no mention of “what happened with the perimeter?” or “what went wrong with the 3x?” So—was I wrong to ignore his problems? I wasn’t sure if it would discourage him too much. (MJ5)

This comment suggests that Linda had not made her decision lightly. Seeing her responses as positive (praising and moving on) or negative (questioning and holding off) feedback for the student, however, seem to have limited her choice of responses. Viewing teacher responses in such terms helps explain why praising students’ “good work” rarely raised much uneasiness, doubt, or tension for these preservice teachers. It also helps explain why dealing with students’ incorrect answers was a common and frequent subject of deliberation for preservice teachers in this study.

7. Exploring alternatives to correcting students’ thinking

Beth tried the problem that I gave her and said that it was easy, but in fact, she was wrong. I was at a total loss because I did not want to come out and say that she is wrong because she mentioned how easy the question was. Even in our class there were a number of people who had the same answer as her when we first got the question. I told Beth this and explained that it is not the correct answer, then I told her how to use one way to solve the problem. (Miriam, MJ3)

Preservice teachers’ uneasiness with students’ incorrect answers is clearly reflected in Linda’s previous comments, as well as in Miriam’s journal entry above where she seems torn by the prospect of having to indicate to her student that her answer is wrong. It is interesting to note that neither Linda nor Miriam saw other alternatives to the responses they gave. Interestingly, they both seemed unprepared to deal with their students’ errors. They seemed to expect their students to arrive at the correct answer and move on to the
next problem. This helps to explain why the preservice teachers’ initial reactions to students’ incorrect answers were to ignore or correct rather than to explore them. Correcting students’ answers, however, was not an easy choice for many of them because, as the previous comments suggest, correcting students seemed to be at odds with their goal of helping students enjoy and not be discouraged in mathematics.

Experiences in the methods course also made it difficult for our preservice teachers to choose to correct their students’ work. The kind of teaching modeled and promoted in the course was very different from the familiar “show and explain” model they had likely experienced as school students. Rather than “telling” students the answers, the classroom teachers portrayed in our text and in selected readings and video clips were seen asking questions and promoting discussion among students. These experiences made them worry about how, if not by telling, they could help their students correct their thinking. Sally, for example, said: “I could allow (students) to explore problems on their own and with others and have them justify their answers, but if they were unsuccessful I’m not sure I could lead them on” (MJ3). Similarly, Lesley pondered about the impossibility of not telling students the answers when, after a heated class discussion, she wrote:

As a teacher I think it will be very difficult not to send signals, directly or indirectly, about the “right” way to think or solve problems. I think it will be very difficult to accept the variety of responses from the class while at the same time trying to teach basic mathematical concepts that have one solution. (Lesley, MJ2)

Sally and Lesley were indeed anticipating the predicament or “teaching paradox” that researchers have said every teacher who wants to help students learn with understanding must face: that is, “the interplay between students making sense or constructing meaning for themselves and making sure that students learn particular mathematics” (Putnam, Heaton, Prawat, & Remillard, 1992; also see Cobb, 1988; and Edwards & Mercer, 1987). This teaching paradox became a reality for preservice teachers in this study as they found themselves responding to students’ incorrect work. For them deciding what to do with students’ incorrect answers was not a simple, nor a straightforward task. Their responses revealed their uneasiness with students not reaching the correct answers and show their attempts to change their tendency to supply students those answers.

8. Allowing students to correct themselves

Three of the four preservice teachers who first received incorrect work from their students chose to supply the answers in return. All of them, however, later regretted having done so when they wrote about it in their journals. “I was at a total loss” said Miriam, “because I did not want to come out and say that she is wrong because she mentioned how easy the question was” (MJ3). “I wish I had asked him how he did this, but I forgot” expressed Carly in her journal attesting to the novelty of asking students to explain wrong answers (MJ3). “I shouldn’t have imposed my answers on them” wrote Sally after receiving mixed feedback from her students about the two solutions she had shared with them—one student claimed she had understood them, the other said they did not make much sense to him. “If I were to do it again” Sally said afterwards, now able to see an alternative, “I would send some play money and have them act (the problem) out” (MJ4).

Marcia, on the other hand, responded to her student’s incorrect work quite differently. Instead of supplying the answer, Marcia tried to help her student figure out his error and correct himself. She restated the problem, included a visual tool, and provided a hint.

Marcia: Here is a problem for you to figure out:

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How many squares can you find in this figure? When you find out the answer, can you tell me how you found it? For example, what did you do first? Next? (ml1)"
G4 student: I liked your puzzle. It was a bit easy. I got 22 squares. Tell me if I was right. I got that answer by adding all the little squares and the big squares and then I look for any squares. (ml2)

Marcia: Do you remember the puzzle I gave you? Your answer was quite close but not high enough. I won’t tell you the answer yet, but I’ll give you some hints. Try to fit all these colored squares in (Marcia sent a set of 4 cut out squares of growing dimensions from a \(1 \times 1\) to a \(4 \times 4\)) as many times as possible (Don’t forget that they can overlap!). (ml2)

In contrast to the others’ replies, Marcia’s response gave the student another opportunity to work on the same problem again and to perhaps notice and correct his error. Another important characteristic of Marcia’s response is that it tries to build on what the student has already done to solve the problem rather than ignoring or disregarding it. After identifying a flaw in the student’s solution method (not considering the overlapping squares), she tries to help the student notice this and use her suggested tool to find the correct number of squares. Furthermore, Marcia’s response is fundamentally different in that instead of seeing her student’s mistaken answer as something that needed to be quickly corrected by the teacher, she took it instead as a learning opportunity for both herself and her student. This is how she said it in her journal entry.

I was surprised to see that John didn’t get the answer to my math problem. I think it was deceptively easy. I’m actually glad that John didn’t find the answer, because I was forced to think of a way to give him some help without giving away the answer. I really felt like I was learning to teach math because I had to find something clear and simple which would help John to solve his problem. I came up with the idea of different sized squares for him to fit into the larger squares. I also gave him the hint that they could overlap. I hope that this helps John along a little. (Marcia, MJ3)

However, it was not very long before other preservice teachers, like Marcia, also began to experiment with alternative ways of responding to their students’ incorrect answers. To help their students overcome their errors and difficulties, preservice teachers began to encourage students to keep working on the same questions and to work with other students. These are a few other examples: “It’s okay if you did not get the magic square problem right away but keep on trying, okay!” (Nilsa); “Maybe you and Parker can work on it together” (Lesley); “I will not give you the answer to the magic square or the seven dwarfs questions yet. I will give you the answers next week. Try them again. Act out the 7 dwarfs question” (Susan).

Many of these responses, however, did not help students reach the correct answers. Notice that the above responses only indicated that they had not reached the right answer and did little to help the student identify their mistake or to think differently about the problem they were trying to solve. The fourth graders, therefore, had a difficult time correcting their work and figuring out what to do differently. Many preservice teachers were disappointed and saw no other alternative but to supply their students with the answers after all. Marcia’s first attempt (reported earlier) was also unsuccessful in helping her student reach the correct solution to the problem she had posed. In reply to the hints and suggestions to help him figure out the number of squares in a 4-by-4 square, Marcia’s student wrote: “I’m working on the problem. I haven’t figured it out yet. It’s a bit hard but I am working on it with someone who has it too” [ml 3]. Marcia, however, persisted once again with her approach of providing hints and suggestions to allow the student to correct himself. Her student, however, continued to reach an incorrect answer. In the end, Marcia resorted (as the others did) to telling her student what the correct answer was. Interestingly, she did not provide any mathematical work or explanation to justify the given answer.
In her journal Marcia tried to justify her decision to supply the answer to her student. She wrote: “I sent John the right answer to this problem because he asked and I felt that he’d probably spent enough time working on the problem and needed to work on something new” (MJ5). It was, however, much later—after the letter exchange had come to its end—that Marcia began to see her responses in a different light. Revisiting these exchanges when writing her case report with a focus on her questions and questioning technique, Marcia explored other possibilities for responding to her student’s answers. This is a small sample of what she had to say:

When I posed this problem to John, I wanted to give him a problem which he had to think about, a problem in which the answer was not instantly obvious. Unfortunately, the way I worded the problem suggests that the answer is fairly obvious. Had I posed the following problem instead, John would have had to do the same math, but would have had to think more deeply about his answer and he may have been more certain about himself and his own knowledge: “A person believes that there are 15 squares in this figure. Do you agree or disagree? How would you defend your answer if someone disagreed with you?” While I did continue to ask John to explain how he got his answer, the question was an “open question not calling for reasoning”, when an “open question calling for reasoning” would have been far more effective and useful to John because it would have asked him to examine his own ideas in depth. (Marcia, CR: p. 7)

A common and important thread between Marcia’s and the highlighted preservice teachers’ responses to students’ incorrect work is their attempts to allow students to correct themselves. Their later discourse shows that they began to use a less directive approach to help their students revise their work, relying on hints, suggestions, tools, and modeling to give students “some help without giving away the answer”, as Marcia said. Their responses are also similar in that they were aimed at helping students reach the correct answers, sometimes at the expense of learning about, or promoting, the students’ understanding. Their responses, however, differ in the extent to which the student’s work is taken into account and in terms of the explicitness and specificity of the feedback provided to the student, as well as on the perceived “success” of the intervention.

9. Probing students’ thinking

The beginning interactions between the reported preservice teachers and their students were very similar to the “Initiation-Response-Feedback” (I-R-F) pattern of discourse researchers have found to be so pervasive across classrooms (see Edwards & Mercer, 1987). This IRF pattern of interaction consists of an initiation by the teacher, which elicits a response from a pupil, which is then followed by an evaluative comment or feedback from the teacher. As it is reported in the research literature on teachers’ discourse, prospective teachers in this study also found it difficult to break away from this pattern of interaction. Later interactions with students, however, revealed subtle changes in their responses to students’ correct and incorrect answers. Instead of simply praising and moving on, the preservice teachers attempted to extend students’ thinking by asking them to explain, justify, or clarify their work. And, instead of supplying students with the correct answer, they began to provide hints and suggest strategies to allow their students to correct themselves.

Another type of response used by some participants in their later exchanges were responses that probed students’ incorrect answers. These were not typical responses and only a few tried them. These responses leaned, instead, more towards probing the students’ solution rather than towards the seemingly pervasive goal of steering students towards the right solution or answer. The following exchange between Lesley and her student (Lynn) serves to illustrate while it also provides a contrast with Marcia’s responses (reported earlier) to her student on a similar problem.

Lesley: Dear Lynn:
Here is a checkerboard. How
many squares can you find in this checkerboard? Can you show me how you get your solutions—with diagrams or number sentences? (P.S. the answer is not 64). (ml2)

G4 student: This is my answer to the question that you ask me, is the answer 92? It was pretty easy for me but I might not get the right answer. The way I did it was I just count how many squares are there. (ml3)

Lesley: I’m glad you liked the checkerboard problem better. There are lots of different ways to solve it. I think you are doing very well but I would like you to show me how you got the answer ‘92.’ You might want to use graph paper to draw it or something like this.

There are 64 of □.

There are ? of □. (ml3)

G4 student: In the small squares there are 64.
In the 4 small squares there are 16.
In the 9 small squares there are 4.
In the 16 small squares there are 4.
In the 25 small squares there are 1.
In the 36 small squares there are 1.
In the 49 small squares there are 1.
In the 64 small squares there are 1.
Then you just add them together then you will get the answer which it is 92. (ml4)

Lesley: Dear Lynn:
Thank you for showing me how you solved the checkerboard problem. …When you explain your solutions or problems/difficulties with a question it helps me to see how you interpret a question. Sometimes I need to explain questions better. Thanks again. (ml4)

Instead of trying to correct the student’s thinking about this particular problem, Lesley’s response seemed to be aimed, instead, at figuring out how the student was thinking about the problem. Her final reply also hints that her motives for responding in such a way had more to do with advancing her understanding about the student’s thinking than with getting the student to reach the correct answer to the problem she had posed. The following exchange between Sally and her student (Jordan) also illustrates the sorts of responses that leaned towards investigating rather than correcting the students’ thinking.

Sally: Do you know other ways to write \( \frac{2}{5} \)? (ml1)

G4 student: Here’s three \( \frac{4}{10}, \frac{5}{10}, \frac{6}{10} \) (ml2)

Sally: Remember you said other ways to write \( \frac{2}{5} \) are \( \frac{4}{10}, \frac{5}{10}, \frac{6}{10} \)? I can see how you got \( \frac{4}{10} \), but I’m a bit puzzled about \( \frac{5}{10} \) and \( \frac{6}{10} \). Can you explain it to me please? (ml2)

G4 student: You said you got puzzled on these answers \( \frac{5}{10}, \frac{6}{10} \). When I got \( \frac{5}{10} \) I checked with my friends and they said I was right. So I thought that if it was \( \frac{5}{10} \) there are (there is) a 2 difference between the numbers. You may not get that, so tell me in your next letter. (ml3)

Sally’s response—“I can see how you got \( \frac{4}{10} \), but I’m a bit puzzled about \( \frac{5}{10} \) and \( \frac{6}{10} \). Can you explain it to me please?”—further illustrates the teacherly reflex of unquestioningly accepting what appears to be a right answer and asking students to explain the wrong ones (Ball, 1991). One has to wonder whether Sally would have questioned her student’s answer if he had not included the last two incorrect fractions. Yet, on the other hand, her response shows a genuine curiosity about the student’s thinking. This is more apparent in her math journal where she wrote: “He seems to have added 1 to both the numerator and denominator of his previous response. I asked him to explain why he gave these answers” (MJ3). Instead of acting on her conjecture to try to correct the student’s thinking, Sally chose to investigate further what the student’s answer meant. The student’s subsequent reply then allowed Sally to
better understand her student’s reasoning about his answer.

Okay, I can see that all his answers have a difference of 2 between numerator and denominator, but why? And what does $\frac{8}{10}$ have to do with it? This is interesting. I will ask him to try to explain again, and also to draw a picture of other fractions that are the same as $\frac{1}{2}$. This is a similar problem, but a new fraction, and also he’s to draw. I wonder if he’ll “get it”? (Sally, MJ4)

These snapshots of Marcia’s, Lesley’s, and Sally’s responses to students’ incorrect work attest to their struggles with the earlier mentioned “teaching paradox” or tension between allowing students to figure things out on their own and showing or telling them what to do. Their responses illustrate the two alternative forms of responses the preservice teachers in this study used to avoid supplying students with the correct answers when their answers were wrong. Marcia’s responses sought to allow the student to correct his error and Lesley’s and Sally’s responses focused on understanding their students’ incorrect work. Their responses are similar in that they divert from the pervasive IRF pattern of discourse that prevailed in the beginning letter exchanges. In contrast, these alternative responses extended the mathematical experience of the student. These responses, however, differ in some important respects. While Marcia may have been too focused on the product of the students’ thinking, that is that the student reached the correct answer, Lesley and Sally seemed too focused on figuring out what their students were thinking and accepted without challenging their students’ erroneous ideas.

In the case of Marcia and Lesley, it could, however, be argued that there is no right answer to the question they asked—“How many squares can you find”? Furthermore, both of their students’ answers satisfy the conditions of the question they were asked. This means that there is no pressure or reason to correct their work. However, it could also be argued that leaving the students’ incorrect answers unchallenged also serves to undermine their learning experiences. The point here is that the reported additions and extensions preservice teachers made to their typical teacherly talk are still open to further reflection and investigation. In other words, there is more for these preservice teachers to ponder about on their attempts to change their discourse when they are faced with actual students’ incorrect answers. However, an important outcome of their interactions with students, regardless of their perceived success or lack thereof, is that they provided a context for them to investigate and experiment with their teacherly discourse.

10. Accounting for changes in preservice teachers’ discourse

In the preceding pages I have reported ways in which an interactive letter writing experience with students provided an occasion for prospective teachers to investigate and problematize their teacherly talk during a mathematics methods course. Their written interactions with students made accessible their tendencies to focus on the correctness of the students’ work. They revealed a tendency to respond to the correct answers with praise and to the incorrect ones by supplying the answers to the problems their students could not solve. Both of these responses tended to close their mathematical conversations with students prematurely and to undermine the students’ mathematical autonomy and sense making. Later interactions, however, revealed changes to these patterns of discourse. These changes took various forms and guises. Some preservice teachers became aware of their tendencies to praise and correct, while others began to experiment with alternative responses to students’ right and wrong answers. Next I will highlight and discuss the role of a course-based field experience along with the interventions by teacher educators that fostered and supported these preservice teachers’ inquiry into their teacherly discourse.

11. Course-based field experience

The design of course-based field experiences is not a simple matter. Although prospective teachers
look forward to them and enjoy the opportunity to work in classrooms, they could have the experience and miss its meaning or, as Dewey once said, there are experiences that can also be miseducative. It is therefore important to pay attention to the certain conditions that could maximize the educational potential of course-based field experiences. Three noteworthy elements in the letter-writing experience that contributed to it being an “educative” experience include: (a) unfamiliarity of the experience, (b) focus on students’ thinking, and (c) time to reflect and revisit the experience. These are elaborated and discussed next.

11.1. Unfamiliarity of the experience

The letter writing project provided preservice teachers in this study a rare opportunity of working with students while attending an on-campus mathematics methods course. This surrogate field experience helped to make the classroom setting unfamiliar in various ways. First, the focus was on the students (not the teacher) of the field classroom, and the interaction took place through writing, which meant that the interaction was delayed, rather than immediate. Some preservice teachers initially rendered problematic this latter feature of the project. The idea of writing math letters to their students was not immediately attractive to everyone. They did not immediately see this as a context to learn about mathematics teaching and learning. Many of them initially questioned the value of such an activity in helping them learn to teach when, as one preservice teacher put it, “I’m not going to be writing letters to my students when I’m teaching”.

Interacting with students through writing, however, was a much more powerful experience than many of them realized. They seemed very aware of and attentive to their experience as they were constantly comparing and contrasting their surrogate field-experience to real classroom practice. Many of them not only recognized the disadvantages of working with students through writing, but also highlighted its advantages. Terry, for instance, wrote:

I decided there are pros and cons to being a penpal. Of course the major con is not being with the student in person and observing their non-verbals. The pros include that if the question Sandy (my penpal) asks me is difficult I can have a lot of time to work on it. Also, the letter gives me the opportunity to experience how difficult it is to write or “say” steps to solving a math problem. Besides math, the letter helps me familiarize myself with how children write. (Terry, MJ3)

Terry highlighted three different and important ways in which the activity of writing math letters to students provided opportunities for preservice teachers’ learning. One important feature of the experience was that it provided them the opportunity to write and communicate mathematically, that is, to engage in the same activity as their students. Their first-hand experience writing in mathematics gave them an important perspective and source for understanding their students’ attempts to communicate their thinking through writing. Terry also alluded to the benefits that the slower pace of the interaction through writing afforded her. The written medium, as Terry said, provided them more time to work on the math problems the students sent and gave them more time to analyze and figure out how to respond to the students’ work.

The slowing effect of writing also allowed the preservice teachers, in the process of writing, to become more aware and deliberate in their responses to students. The letters also provided an immediate written record of the interactions with students, which they could easily refer to and further analyze in their journals. Having easy and immediate access to such records (instead of a reconstructed version) made it easier to analyze their questions and the students’ work on more than one occasion and to share it with others, including the instructors. This was an important feature of the experience because, as reported earlier, it was upon revisiting the letters that most preservice teachers became aware of the hidden messages in their discourse.
11.2. Focus on students’ thinking

Looking closely at students’ ideas has become a strategy for helping practicing teachers examine and reconsider their teaching practice. This study provides further evidence of the transformational influence that working closely with students has on the learning not only of experienced teachers (as the CGI studies have found, e.g., Fennema et al., 1996), but of prospective teachers as well. In this study, the students’ written work and feedback was a particularly salient catalyst to the preservice teachers’ thinking and practice. It encouraged them to focus their attention on their discourse, particularly when the students’ work was not quite what they had expected. Surprises from their students’ work and feedback served to challenge their responses and to encourage them to search for alternative forms of questioning. The fourth graders’ work also encouraged the preservice teachers to examine the relationship between their teacherly discourse and students’ mathematical communication.

Students’ incorrect work, for instance, raised much tension and deliberation for prospective teachers in this study. It brought to the fore an important dilemma or paradox of teaching, that of encouraging students to make sense on their own while making sure that they learn particular content. In the process of figuring out alternatives to explicitly telling students that their answers were wrong, preservice teachers deliberated on the possible damaging effects of providing corrective feedback to students. Furthermore, they began to break away from the pervasive IRF model of classroom interaction by incorporating probing questions in their feedback to students’ incorrect work. In contrast, the practice of praising students’ correct work did not raise immediate tension for preservice teachers in this study. Responses to students’ correct work became problematic only when the work was deemed to be computationally correct but the evidence to support that work was considered incomplete, unclear, or simply absent. Although not everyone explicitly interrogated the practice of praising, they made multiple additions to praising the students for getting the correct answer.

11.3. Opportunity to revisit and reflect on interactions

Journal writing played an important role in helping our preservice teachers attend to their teacherly discourse. They were encouraged to write in their journals about their experiences with students after each letter exchange. These after-the-fact reflections allowed them to make their thinking explicit, notice more, raise questions, think of alternative responses, explore other possible interpretations, and to integrate or connect their interactive experiences with the course’s (and other courses’) ideas and assigned readings. The value of reflecting on what was already done, on the other hand, was not readily apparent to some participants, since as one preservice teacher said: “I cannot change what I did”. Some found it painful and distressful to realize, when it was “too late”, what they “should have” done instead. In time, however, these kinds of reflections became a little easier to record and to see as a source for learning about and from their experiences.

Writing a case report at the end of the course was another opportunity the preservice teachers had to further reflect on their learning experiences away from the demands and pressures of the course activities. This writing, while it could be focused on a broad educational issue or theme, served to narrow the scope of the experience. It helped organize their reflections more concisely into a coherent (stand-alone) narrative or story relating and examining their ideas and understandings about teaching and learning mathematics. Many preservice teachers reported that they gained new and unexpected insights when writing their last assignment. Carly and Megan, for instance, examined the positive and negative messages that their responses were giving to their students, as well as the messages they were conveying about the right answers. The case writing assignment, therefore, provided many of them the opportunity to stand back from their experience and gain a different perspective on their work with students. It provided further time and resources to revisit and reanalyze the interactive data they had collected and the reflections they had written in their journals.
12. Teacher educator’s interventions

The teacher educators in this study, myself included, made many instructional interventions with the intention of fostering and supporting their preservice teachers’ inquiries. Not all of our pedagogical interventions, however, turned out to be helpful or appreciated. Here I will focus on the instructional interventions that played a prominent role in promoting their learning in the context of their interactive investigations with students. Three important interventions included: (1) debriefing the experience, (2) responding to journals, and (3) modeling inquiry.

12.1. Debriefing the experience

It is often said that one can have an experience and miss its meaning. For this reason we offered multiple opportunities for our preservice teachers’ experiences to be shared and discussed. The main issue for us was that since each preservice teacher worked with different students, they did not investigate or try out the same things. Therefore it was a challenge to connect and build upon each other’s experiences. Reading and writing their individual letters within a group of peers, however, provided the opportunity to share their views, doubts, issues, and questions with each other. There were some visible effects of such conversations. For instance, two of the groups collaborated by choosing the same problems to try out with their students. They were often heard debating the relative worth of the various problems they were considering. Another group decided to use the same type of exploratory response with their students and examine the students’ reactions. These collaborations allowed them to contrast and enrich their individualized experiences. One drawback of this form of small group debriefing, however, was that for the teacher educator in the room it was hard to participate and intervene in such conversations.

On three occasions we required all of the groups to pose the same problem (with needed modifications) to their respective student(s). This turned out to be an important pedagogical intervention. Preservice teachers in two of the five groups had been working collaboratively prior to this intervention whereas those in the other three groups were mostly working on their own. Sending problems within the same mathematical topic to students helped these preservice teachers to collaboratively discuss and modify problems and to receive comparable students’ work and therefore collaborate in the analysis process. This facilitated collaboration within and across groups and made it possible for the instructors to organize classroom discussions and activities for the whole class.

Constraining the choice of problems seemed initially, at least to me, likely to limit our preservice teachers’ investigations. It would, for example, not invite them to reflect on their reasons for choosing and posing problems to students. The individual selection of problems, on the other hand, proved to be problematic as it provided few opportunities for the whole class to share and discuss issues of mathematics and pedagogy which were common to everyone. Posing a similar type of problem served to address this issue. Many preservice teachers appreciated and benefited from this addition to the structure of the penpal project. They reported finding it helpful to learn how other Grade 4 students interpreted and worked on their math problems, how their peers had phrased and contextualized their questions, and what hints and manipulatives others had thought to send with their letters.

12.2. Responding to journals

As mentioned earlier, intervening in preservice teachers’ individual investigations was not an easy task. Their journals were the main place where we, the instructors, could learn about where their investigations were heading. During classes, there were opportunities for group discussions but there was not a lot of time to debrief to the whole class afterwards, or to give us, the instructors, the opportunity to hear everyone’s ideas for investigations and therefore respond and intervene in that setting. Similarly, the letter reading and writing sessions allowed for little time to debrief everyone’s ideas and concerns, and it tended to keep students isolated from each other and the
instructors, once they engaged in the writing of their letters. The journal responses, therefore, became the main pedagogical tool for responding and intervening in our preservice teachers’ investigations.

For all of us, responding to weekly journal entries was a novel experience. We had included written assignments in our previous courses before and were no strangers to preservice teachers’ written discourse. We were, however, not accustomed to responding to weekly journal entries all through a course. Our journal responses therefore were not as carefully constructed as they could have been. However, our comments were meant to help our preservice teachers extend their thinking about the issues they had raised and to help them consider alternative viewpoints when necessary. When the preservice teachers, for example, wrote that they did not think their students could solve a particular problem, we pushed them to think and elaborate why they thought so. When they wrote that their students did or did not understand a particular concept, we asked whether there was enough evidence to reach such a conclusion. When they wrote that they were dissatisfied with how they had responded to their students’ mathematical question or work, we asked them to think and elaborate on other alternatives for a response.

In addition to questioning, challenging, and probing our preservice teachers’ thinking, we also responded by sharing ideas they could try, as well as our own interpretations of the letter exchanges they had shared. We also responded with comments about the quality of their journal entries by encouraging more analytical entries, by noting they had explored a difficult issue, or by noting that their entries had been very insightful. Initially, our preservice teachers did not address our responses in their following journal entries, although some later pointed out that they had done so in thought while reading our responses to their entries. Some of them even considered our responses, particularly our questions, to be a negative assessment of their work. It did take a while for our preservice teachers to appreciate and use our journal responses as a tool for further inquiry.

12.3. Modeling inquiry

All through the course my colleagues and I modeled all aspects of inquiry that we wished our preservice teachers would consider and try out. We modeled ways of working with students and ways of reflecting on one’s practice. I related earlier that at the beginning of the course we brought four guest school students into the class. This was one of the ways in which we modeled teaching that focused on inquiring into students’ thinking and that paid attention to the teacher’s discourse. We also provided examples of inquiry from our own journals. In my case, because I also participated in the letter writing project and corresponded with two fourth graders, I was able to share my letters and use them to model inquiry through the questions that I raised about my young students’ thinking and about my responding practices.

Fig. 1 shows an example of the kinds of journal entries I shared. In this example I wrote the actual text of the interaction and made my thinking and deliberations explicit about the questions I had about the students’ work and about the choices I was considering in my response. This intervention proved to be very fruitful and timely. Up to that point, preservice teachers’ journal entries had focused on reporting more than on analyzing or reflecting on their interactive experiences with students. This intervention helped to focus their inquiry towards their students’ thinking and towards their teacherly discourse by providing a structure for their journal entries that separated and distinguished their description of, and reflection on, the experience. This structure also allowed the instructors to have access to the actual interactive experience and interject alternative viewpoints and explanations when needed.

13. Concluding thoughts

This study offers not only a practical solution to the typical disconnection between the on-campus and school experiences of most teacher preparation programs, it also provides a window into the kind of deliberations prospective teachers are able to generate prior to their student teaching
experiences. Furthermore, it provides teacher educators who may want to encourage their prospective teachers to investigate their teacherly talk with insights into the kinds of issues that a particular group of prospective teachers chose to attend to and interrogate. The unfamiliarity of the field-related experience, its focus on students’ thinking, and the opportunity to revisit the experience were highlighted as essential design features of the field-related experience. Teacher educator’s debriefing of the experience, responding to journals, and modeling inquiry, were also highlighted as necessary interventions to support preservice teachers’ investigations.

This study serves to raise two important questions for teacher educators who might try to incorporate course-related field experiences into their on-campus courses. What sorts of on-campus course experiences can better support, extend and balance prospective teachers’ individual and whole class investigations of teacher talk? A second question one might ask is: how might teacher educators help to make problematic issues of classroom discourse, such as teacher praise, which may not be so readily investigated by prospective teachers? For this teacher educator, this study has already opened her eyes to the challenges and possibilities of course-based field experiences and

<table>
<thead>
<tr>
<th>Sandra: [1st letter]</th>
<th>Letter Exchange</th>
<th>My Reflections</th>
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<tbody>
<tr>
<td>I made this math problem for you to try. Tell me if you like it or not and if it is the kind of problem you like figuring out.</td>
<td>The blue problem is easy because it is just straight dividing. The answer is 2r2. Challenge Guess how many family members we have?</td>
<td>Tommy apparently used division but I'm not sure if he did it on paper, in his head, or a calculator. I liked how he created a math challenge for me to figure out from his response. I wonder though if he knows I can solve it with the available information or if he literally means to take a guess. His answer 2r2 doesn't really answer the question in the problem. It is the results of the calculations he made but doesn't refer back to the question posed in the problem. Should I explain the difference to him? I think I should. Does he know what 2r2 means and what each component means? Should I ask what he would do with the two left over cookies and perhaps suggest he can break them?</td>
</tr>
<tr>
<td>You have a dozen cookies and want to share them among the members of your family at supper. How many can each person have?</td>
<td>In your next letter please tell me how you got your answer and show me all your work. I want to understand how you did it.</td>
<td>...</td>
</tr>
<tr>
<td>In your next letter please tell me how you got your answer and show me all your work. I want to understand how you did it.</td>
<td>The blue problem is easy because it is just straight dividing. The answer is 2r2. Challenge Guess how many family members we have?</td>
<td>Tommy apparently used division but I'm not sure if he did it on paper, in his head, or a calculator. I liked how he created a math challenge for me to figure out from his response. I wonder though if he knows I can solve it with the available information or if he literally means to take a guess. His answer 2r2 doesn't really answer the question in the problem. It is the results of the calculations he made but doesn't refer back to the question posed in the problem. Should I explain the difference to him? I think I should. Does he know what 2r2 means and what each component means? Should I ask what he would do with the two left over cookies and perhaps suggest he can break them?</td>
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Fig. 1. Sample of Sandra’s journal.
what it might take to engage preservice teachers in the analysis of their teacherly discourse.

For instance, as a result of this study I have become more aware of and attentive to the issues prospective teachers raise and struggle with when they face students’ correct and incorrect work. I am now better prepared to help my future students problematize their teacherly talk. I would not, for instance, allow the issue of praise to go unnoticed for so many of my students. I would not let Marcia, Lesley, and Sally wait until the end of the term to notice the drawbacks of their alternative responses to students’ incorrect answers. If I had to do it all over again, the one important intervention that I would work to improve is the debriefing time. I would probably structure the debriefing around a common “artifact of practice”, either my own or one from a volunteer preservice teacher. Such artifacts were readily available in this form of interactive experience with young students. I would use this form of debriefing to focus the class discussions around issues of responding to students’ right and wrong answers.

This work also raises questions worth considering in future research studies. An important issue and frequently asked question of the design and study of pedagogical innovations in teacher preparation courses is whether the knowledge and skills these help to develop are carried over to the practice setting. In this study, preservice teachers were facing, identifying, and deliberating on their responding practices and work with students. Theories of learning suggest that learning in such close relationship to the context of “authentic practice” would make it possible for these preservice teachers to draw from and use their newly developed understandings and skills in similar circumstances. However, this is still an empirical question that is worth exploring—under what conditions and circumstances do prospective teachers draw upon knowledge and skills they have gained in their teacher preparation courses? This and further research on possible differences and similarities in the discourse, practice and inquiry that various contexts generate for prospective teachers could greatly contribute to teacher education’s ultimate quest to provide useful and worthwhile programmatic experiences to teacher candidates.

References


