Learning from Teaching: Why Analysis Abilities Are an Important Component of Teacher Knowledge

Rossella Santagata

As we make progress in understanding the complexity of teaching, and as we change our expectations of what our children should learn in school to keep up with advances in knowledge and technologies, our list of things that teachers need to know seems to grow ever longer (Darling-Hammond and Bransford 2005; National Research Council 2001).

Teachers should master the subject matter they teach, they should know about effective pedagogies, and they should know how students understand key ideas of the subject matter and what representations facilitate students’ learning of these key ideas. In other words, they should possess what Shulman (1986) calls “pedagogical content knowledge.”

Teachers should also possess knowledge of assessments, know how to analyze and interpret student achievement data, know how children develop from both a cognitive and a socioemotional perspective, and know what technologies best assist student learning and be able to use these technologies effectively.

This chapter is not meant to present a comprehensive list of what teachers need to know. But even if we stopped here and considered the list satisfactory, a question would arise: when and from whom are teachers supposed to acquire these different types of knowledge?

Teacher preparation programs are struggling to find the time to cover all aspects of teacher knowledge and often have to prioritize, including some areas and excluding others. Knowledge often remains too abstract because future teachers are not given enough opportunities to connect what they learn in university courses to the practical aspects of the work of teaching.

Once teachers enter the teaching profession, we expect professional development to fill gaps in teacher knowledge. Again, time is limited.

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Teachers are often asked to participate in professional development on a volunteer basis during after-school hours. High-quality professional development is not always available and can be costly. What’s more, the content of professional development is too often weakly linked to teachers’ daily practices.

This is not to say that teacher preparation and professional development should be avoided. They are certainly necessary, but they are not sufficient—at least as they are traditionally organized. In this chapter, I argue that preparation programs and professional development experiences should teach teachers how to learn in the context of their job. I will talk about what it means for teachers to be able to learn from teaching, and how they can acquire knowledge and skills that will assist them in doing so.

**Learning from Teaching and Teacher Professional Vision**

Learning from teaching is embedded in teachers’ daily work in the classroom; it’s a habit of mind. It does not happen automatically, though; experience is not enough. We all know teachers who have many years of teaching experience but who are not particularly effective. So how can teachers learn to learn from teaching? To answer this question, we need to take a step back and ask another question: On what should teachers focus when they reflect on their own teaching if they wish to learn from it? In other words, what approach to the analysis of one’s teaching leads to the new knowledge that guides improvement?

Teaching is complex, and many things occur at once during a classroom lesson. When first exposed to examples of teaching, preservice teachers tend to focus on irrelevant features, such as the way model teachers look, the sound of their voices, and the gestures they use (Fuller and Manning 1973). Beyond attention to such superficial features, reflecting on teaching can become overwhelming (Santagata, Zannoni, and Stigler 2007). Teachers need to know where to place their focus if they wish to learn from their practice.

Drawing from the work of linguistic anthropologist Chuck Goodwin (1994), Miriam Sherin describes teachers’ ability to analyze teaching as “professional vision.” Like other professionals using “vision,” teachers develop specific ways to notice and make sense of the events that matter to
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their work. Professional vision consists of two subprocesses: (1) selective attention and (2) knowledge-based reasoning. Selective attention signifies the isolation of, focus on, and comprehension of a specific event or feature within the complex reality of teaching during either live observation or observation of videotaped classroom instruction. Knowledge-based reasoning means the interpretation of what was observed through the application of one’s knowledge and understanding (Sherin 2007).

E. A. van Es and Sherin (2002) situate professional vision more precisely in the job of teaching by describing teachers’ ability to “notice.” “Noticing” includes the following set of professional skills: (1) identifying what is important and noteworthy about a classroom situation; (2) making connections between the specifics of classroom interactions and the broader principles of teaching and learning they represent; and (3) using what one knows about the context (including knowledge of subject matter, how students think about the subject matter, and the local context) to reason about classroom interactions. Reasoning about classroom events that one notices is as important as noticing the events in the first place. Reasoning is about ascribing meaning to what was observed and interpreting it in ways that have implications for subsequent pedagogical decisions (van Es and Sherin 2008).

To a certain extent, every teacher engages in acts of noticing. However, many agree that expert teachers’ noticing skills are more refined than those of novices (Berliner 2001; Berthoff 1987; Cochran-Smith and Lytle 1993, 1999; Schön 1983). For example, expert teachers are capable of monitoring, understanding, and interpreting multiple events occurring in the classroom in more detail and with more insight than are novices (Sabers, Cushing, and Berliner 1991). When reflecting on their lessons, expert teachers select classroom events that they believe had an impact on the achievement of the lessons’ learning goals (Borko and Livingston 1989). While novice teachers tend to adhere rigidly to lesson plans, expert teachers pay attention to student learning while they teach, reason about it, and make decisions on the spot in response to specific student difficulties (Berliner 2001). Thus, expert teachers seem to have ways to attend to and reason about their teaching that allow them to learn from it.

Can all teachers be taught to pay attention to important elements of teaching and to reason about them in productive ways? As a field, we are beginning
to collect evidence showing that it is possible to teach these skills to teachers (van Es and Sherin 2008; Star and Strickland 2008; Wang and Hartley 2003). In a study that two of my colleagues and I conducted with preservice teachers, we found that a structured, video-based intervention focused on lesson-analysis skills improved their ability to observe a lesson and reflect productively on it. To measure participants’ improvement in lesson-analysis skills, we asked them to comment on a videotaped lesson both before and after the intervention. Study findings showed that the preservice teachers improved significantly in their ability to analyze the lesson in several ways: (1) their comments became less descriptive and more elaborate, (2) they focused more on the specific mathematics targeted by the lesson, (3) they focused more on student thinking and learning, (4) they became more critical, and (5) they were able to propose alternative instructional strategies and explain why those strategies would be more effective for student learning (Santagata, Zannoni, and Stigler 2007).

The UCI Learning to Learn from Mathematics Teaching Project

This work informs a new program of research I have begun at the University of California, Irvine: the Learning to Learn from Mathematics Teaching project. This project revolves around a course for preservice teachers that I teach in the elementary teacher preparation program. The course has two fundamental goals:

1. To develop an appreciation for continuous improvement and for the complexity of student thinking
2. To develop analysis skills and mathematics teaching strategies that facilitate learning from teaching

The course includes the use of a specific framework for observing and analyzing teaching, as well as opportunities to practice the use of instructional strategies for making student thinking visible. Areas of focus are the design of mathematical tasks and the building of a classroom discourse community.

Preservice teachers are given multiple opportunities to learn from teaching episodes. I use a framework called the Lesson Analysis Framework (Santagata,
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Zannoni, and Stigler 2007) (see Table 1) to guide their reflections and analysis of lessons. This framework draws from the expert-novice literature summarized in the preceding paragraphs and focuses teachers’ attention both on what students are learning from a lesson and on the instructional strategies that contributed to that learning. It also asks teachers to be critical and to propose alternatives to what they have observed. Preservice teachers use this framework to analyze the teaching of others as well as their own teaching.

Table 1. The Lesson Analysis Framework

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<thead>
<tr>
<th>Lesson Learning Goal(s)</th>
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<td>What are the main ideas students are supposed to understand through this lesson?</td>
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<table>
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<tr>
<th>Analysis of Student Learning</th>
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<tr>
<td>Did the students make progress toward the learning goal(s)? What evidence do we have that students made progress? What evidence do we have that students did not make progress? What evidence is missing? Which instructional strategies assisted students in making progress toward the learning goals, and which did not?</td>
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<tr>
<th>Alternative Strategies</th>
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<tr>
<td>What alternative strategies could the teacher use? How do you expect these strategies to impact students’ achievement of the lesson learning goal(s)?</td>
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The course takes advantage of digital video technology to give teachers examples of lessons that make student thinking visible. These lessons allow teachers to reflect on student learning processes and to learn about instructional strategies that positively affect student learning. In addition, video is used for preservice teachers to capture their own teaching, reflect on it, and share experiences with their colleagues. The course includes a variety of activities that actively engage preservice teachers in learning from teaching. In addition to observation of videotaped lessons, these activities include live observations of teaching; an interview with a single student to practice questioning that unveils student thinking; grade-level group-lesson planning, lesson implementation, and reflection on the impact of a lesson on student learning; and sharing of student work. The course ends with a public
presentation of preservice teachers’ work through the sharing of video clips of their teaching, along with posters illustrating their grade-level group lessons and student work collected as part of those lessons. Preservice teachers also reflect on what they have learned about teaching from all course activities and what next steps they would like to take to improve their practices.

Parallel to the course, a variety of data are being collected to study preservice teachers’ learning processes and outcomes. A follow-up project will also investigate the long-term impact of the course on participants’ ability to learn from their teaching once they enter the teaching profession. Although quantitative data is not yet available, I will share two quotes from interviews with study participants that illustrate preservice teachers’ perception of their learning from the course.

In the following quote, the preservice teacher reflects on her ability to learn from the observation of a classroom lesson:

> I had no idea what to look for in an effective classroom. I thought that, you know, a good use of manipulatives and, you know, classroom management and varied materials was sort of the most important, and [so] that’s what I commented on and that’s what I looked for. Just making sure things looked kind of organized. . . . But when we went back [to observe the same lesson again at the end of the course], there were all these kinds of opportunities that the teacher had missed. . . . I learned how to . . . effectively analyze a classroom lesson . . . using a new lens.

In addition to acquiring specific skills that will allow these teachers to learn from their practice once they enter the teaching profession, preservice teachers in the Learning to Learn from Mathematics Teaching course also learn to see themselves as learners. Following is an excerpt from an interview with another course participant:

> Like the students, the teachers are also learners, and you need to learn by really sitting down and reflecting and analyzing what happened during the lesson and [realize] that it’s not always going to go the way you want or rarely go the way you want, but it’s what you can draw from it and what you make of it.
Conclusions

Although the demands on teacher knowledge today are higher than they were in the past, the settings in which teachers acquire such knowledge (i.e., preparation programs and professional development activities) are virtually unchanged. This makes it impossible for teachers to enter their classrooms knowing everything they need to know. Learning in the context of teaching, then, becomes a necessity. Learning from teaching does not happen automatically, though; teachers need to know how to systematically analyze and reflect on their teaching in order to generate knowledge that will guide improvements. Expert teachers have been observed to possess these skills. In this chapter, I have described a project—Learning to Learn from Mathematics Teaching—that focuses on placing preservice teachers on the trajectory to become experts in lesson analysis skills.

References


