Knowledge and Teaching [1]

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ABSTRACT The present paper focuses on a particular kind of knowledge—craft knowledge—in which Huberman was interested. The paper contrasts craft knowledge with two other kinds of knowledge often thought to be useful to teaching: systematic knowledge of the sort that comes from research and is taught in university settings, and prescriptive knowledge of the sort that is often codified in state and local policies. Using a study of 45 teachers’ lessons, and interviews regarding these lessons, the present paper examines the role each kind of knowledge appears to play in the improvement of practice.

Introduction
The first article I ever read by Michael Huberman was ‘Recipes for busy kitchens’ (1983), and it had two lasting effects on me. It created a continuing interest in reading anything else Michael Huberman ever wrote, and it reinforced a continuing interest I already had in the nature of knowledge derived from teaching and how that knowledge differed from, or could be influenced by, research knowledge. Huberman called teachers’ knowledge ‘craft knowledge’. He argued that it was largely idiosyncratic and non-theoretical and that improvements in teaching came more from continual tinkering than from the kind of systematic analysis of underlying patterns that academicians value. Huberman was not the first person to notice this in teachers, but he may have been the first to suggest that craft knowledge might be a good thing. His discussion contrasts sharply, for instance, with Jackson’s (1968) discussion of teachers’ thinking. In that text, Jackson seems to criticize teachers because their language is conceptually simple, because they seem uninterested in causes or underlying patterns, because they prefer intuition to analysis, and because, in spite of their lack of analysis, teachers are very opinionated. Huberman did not seem to disapprove of teachers’ intellectual approach and the knowledge it yielded. Instead, he called it ‘craft knowledge’, and in so doing legitimized it.

This interest in knowledge and practice continued to permeate Huberman’s work and it has continued to permeate mine. His work and mine has examined the relationship between research and practice (Huberman, 1989, 1993a, 1999; Kennedy, 1983, 1984, 1997, 2000), and we have also investigated the nature of craft knowledge (Huberman, 1983, 1993b; Kennedy, 1999).

It might seem as though questions about the nature of teachers’ knowledge would be largely theoretical, lacking much practical import, but the desire to
reform teaching seems to be universal, and reform cannot succeed without some understanding of how teachers think about their work. In fact, one of Huberman’s findings from his study of teachers’ biographies was that early participation in reform tended to lead to later ‘disenchantment’ (Huberman, 1994). Conversely, he found that teachers who steered clear of reform efforts and instead worked privately on their own classroom tinkering were more satisfied at the end of their careers. (Of course, critics can readily point out that his study does not tell us whether teachers were justified in their work satisfaction. Perhaps those who participated in reform did actually teach better. The study tells us only that teachers judge their own practice better; it does not tell us how others might have judged these same practices.)

Huberman never pursued the question of teachers and reform much further than this, but this fascinating finding about the influence of reform on teachers’ careers is worth attention. It raises the question of how reform movements interact with craft knowledge and how their impact might differ from the impact of, say, research knowledge, or of other kinds of systematic knowledge that teachers acquire in college or in professional development programs. Reforms, after all, differ from these other sources of knowledge in important ways. For instance, they nearly always contain a zealorous certitude. They tend to include a lot of imperatives: teachers ‘should’ do this, students ‘should’ learn that. Another important feature of reforms is that teachers’ exposure to reform ideas often comes from the bureaucracy itself. That is, the things reformers believe should happen become articulated in curriculum materials, tests, and other policy documents. So reform-based knowledge differs from both craft knowledge and from systematic knowledge.

In fact, I propose that we distinguish three separate sources of knowledge that are relevant to teaching. First, there is ‘craft knowledge’, which is largely acquired through experience and which tends to be a-theoretical and idiosyncratic. Then there is ‘systematic knowledge’, which is acquired mainly through colleges and universities, research articles, journals and professional associations, and which tends to be more theoretical, codified and abstract. Finally, there is ‘prescriptive knowledge’, which is generally acquired through institutional policies and which tends to consist of ‘should’ and ‘ought’ statements. Prescriptive knowledge is more codified than craft knowledge but is less theoretical than systematic knowledge. It is also more susceptible to fads, as public policies wax and wane. One of its most important features, however, is that it contains an air of certainty that is lacking in either of the other two forms of knowledge. In each iteration of reform, advocates are convinced that the new ideas they are trying to impose on teachers are better than the old ideas they tried to impose on teachers, and they use institutional resources in every way they can to try to influence teaching practices.

I had an opportunity recently to contrast these three kinds of knowledge and to see how, and how often, each influenced teaching practices. I did this as part of a larger study of teachers’ reasoning about their practice. The study began with the premise that teachers are thinking about many more issues than reformers are thinking about, and that interviews with teachers about their general practices do
not allow for these numerous considerations to be revealed. One result is that, when teachers are interviewed, they may say that they are implementing a reform, and may describe broad patterns in their 'reformed' practice, yet for decades observers have claimed they could not see evidence of the things the teachers have described (Oliver, 1953; Bussis et al., 1976; Cohen, 1990; Applebee, 1991). When I initiated the study, I suspected that these disparities occurred because, even though teachers intended to pursue a particular course of action, they adjusted their specific moves to accommodate their interpretation of specific situations. I wanted to see how teachers thought about very specific actions—not their underlying philosophical commitments, but their reasons for doing particular things at particular moments. In the study, my colleagues and I videotaped teachers’ lessons and then interviewed them about these lessons. Both the teachers and the researchers reviewed the videotape prior to the interview, and both could nominate episodes to discuss in the interview. Forty-five teachers were videotaped and interviewed, and 533 specific episodes were discussed. Among other things, we tried to ascertain the source of teachers’ ideas for their practices. My goal for the present paper is to describe the roles of three central influences on teachers’ practices—craft knowledge, systematic knowledge, and prescriptive knowledge.

Sources of New Ideas

One question we frequently asked was whether teachers would have handled a situation ‘like this one’ differently at some earlier point in their careers and, if so, what motivated the change. Virtually all of the changes that teachers described were considered by them to be improvements, and they reported that virtually all of them derived from acquiring new and better ideas [1]. These ideas came from a wide variety of sources—not just those we tend to expect, like professional development courses, but advice from husbands or brothers, newspaper articles and therapy. One problem with categorizing new ideas from such testimony, of course, is that it is not possible to examine the original source that teachers describe. Instead, we must rely only on what they tell us, and of course no teacher described a new idea as having the qualities of craft knowledge or of systematic knowledge. What I have done here is to match the sources of teachers’ ideas with the kind of knowledge these sources tend to provide. Experience, for instance, tends to provide craft knowledge, and professional development courses tend to provide systematic knowledge. Table I groups these many sources of ideas into three broad categories reflecting the three kinds of knowledge—craft, prescriptive, and systematic—that they presumably offer. Not all sources of ideas, of course, necessarily provide the kinds of knowledge I have attributed to them, so the frequencies shown here should be viewed as approximate. No doubt some professional development courses provide prescriptive or craft knowledge, some of what teachers learn from experience may be systematic, etc.

Notice that the differences in frequencies are not substantial. Indeed, one interpretation of Table I is that these three sources of ideas are nearly tied in their apparent influence on teaching practice. But such a conclusion does not necess-
TABLE I. Sources of new ideas cited across all teaching episodes

<table>
<thead>
<tr>
<th>Craft sources</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Experience as a teacher</td>
<td>40</td>
</tr>
<tr>
<td>Spontaneous ideas</td>
<td>14</td>
</tr>
<tr>
<td>Experience as a child</td>
<td>12</td>
</tr>
<tr>
<td>Experience as a parent</td>
<td>10</td>
</tr>
<tr>
<td>How I’d feel if it were me</td>
<td>10</td>
</tr>
<tr>
<td>Own materials</td>
<td>9</td>
</tr>
<tr>
<td>Fads</td>
<td>8</td>
</tr>
<tr>
<td>Miscellaneous other sources</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prescriptive sources</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tests and accountability systems</td>
<td>33</td>
</tr>
<tr>
<td>Curriculum standards and guides</td>
<td>23</td>
</tr>
<tr>
<td>Specific textbooks</td>
<td>24</td>
</tr>
<tr>
<td>School building requirements</td>
<td>13</td>
</tr>
<tr>
<td>Other policies</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>117</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Systematic sources</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional development programs</td>
<td>60</td>
</tr>
<tr>
<td>University courses</td>
<td>9</td>
</tr>
<tr>
<td>Colleagues</td>
<td>15</td>
</tr>
<tr>
<td>Research findings</td>
<td>8</td>
</tr>
<tr>
<td>Professional associations</td>
<td>3</td>
</tr>
<tr>
<td>National Board of Professional Teaching Standards</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

arily follow because these frequencies do not indicate the ‘nature’ or ‘degree’ of influence. Sometimes when teachers mention a source, they mention it with a shrug, suggesting that it was a relatively minor influence. Other times, they mention a particular encounter with knowledge as a life-changing experience.

One way to sort out these influences is to examine the types of issues teachers were concerned about when they sought out or acquired the new idea. For instance, one new idea might be adopted in order to satisfy a personal need the teacher had for, say, some quiet time; another new idea might be introduced in order to nurture a sense of community in the classroom; and still a third might be introduced to improve efficient movement through the lesson. I cross-tabulated the sources of teachers’ new ideas with the areas of concern that they addressed. These areas of concern were, in order of how frequently they were mentioned: orderly task progress, student willingness to participate in the lesson, content coverage and student learning goals, methods of fostering student learning, nurturing the classroom as a community and personal needs. Table II presents the
areas of concern that were mentioned when teachers referred to each source for new ideas.

Table II shows that teachers referred to sources of craft knowledge mainly when they were concerned about student willingness to participate in the lesson or improving orderly task progress; they referred to sources of systematic knowledge mostly when they were concerned about how to foster student learning; and they referred to sources of prescriptive knowledge mainly when they were concerned about content coverage and student learning goals. This pattern suggests that each source of knowledge may offer its own types of benefits to teachers. Moreover, since all six of these areas of concern are important for teachers to think about, and all of them need to be addressed by teachers, the pattern suggests that teachers need all three kinds of knowledge. Because each source has its own influence, however, we need to examine each one separately to see how and when it improves practice.

**Craft Knowledge**

Among the sources that I have associated with craft knowledge, teachers made more references to learning from experience than to any other source of craft knowledge. Often, their references to what they actually learned from experience were vague, and the specifics of the experiences that contributed to their knowledge were equally vague. There were numerous statements to the effect that they just picked this up over time, or just figured it out with experience. However, it is possible to learn more about how experience contributes to knowledge by examining teachers’ interpretations of their own lessons. When we asked teachers to view the videotapes and to select episodes to talk about, we stated that our interest was in how teachers made their moment-to-moment decisions, and we asked them to select moments during which they were especially aware of their own thoughts. Our instruction said:

<table>
<thead>
<tr>
<th>Area of concern</th>
<th>Craft</th>
<th>Prescriptive</th>
<th>Systematic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson flow</td>
<td>25</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Student willing to participate</td>
<td>28</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Content coverage</td>
<td>13</td>
<td>38</td>
<td>10</td>
</tr>
<tr>
<td>Fostering student learning</td>
<td>22</td>
<td>32</td>
<td>63</td>
</tr>
<tr>
<td>Classroom as community</td>
<td>16</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Personal need</td>
<td>6</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
In preparation for the interview, try to select a couple of episodes that were interesting or important to you. These might be times when

- something unexpected happened;
- you suddenly had an insight about what was going on;
- you were unsure about what to do next; or
- you realize something now, in retrospect, that you didn’t think of at the time.

With this general guidance, we nevertheless found that most of the episodes teachers brought up were motivated by ‘evaluative judgments’ about the success or failure of their practices rather than by an awareness of their own in-the-moment deliberations. Teachers volunteered that they had spent too long on one segment, had failed to see a student whose hand was raised, or were glad they had remembered to attend to a particular detail. The prevalence of these evaluative judgments suggests that teachers do routinely review and critique their own practices. Moreover, their critiques give us some insights into how teachers review their daily experiences, and perhaps what they learn from them.

Most of the episodes that teachers nominated for discussion were nominated because the teachers were dissatisfied with their own performance. In fact, they nominated 44 episodes because they were dissatisfied with them, but nominated only 16 because they were pleased with them. This is a ratio of almost 3 : 1. So one way to examine the formation of craft knowledge is to look at how teachers used their dissatisfaction to understand and improve their practice.

If teachers routinely notice problems and also generate ideas for how to handle these situations better in the future, then a great deal of learning could follow from the process of self-critique. What we need to see, then, is the kinds of conclusions teachers drew from their self-critiques. For if teachers are merely critical, without thinking through what they could have done differently, little learning can occur.

I sorted teachers’ self-critiques according to the kinds of conclusions teachers drew from them. I was interested in the extent to which teachers simply evaluated their practice, without trying to find a way to improve it, versus using the evaluation as a first step in a longer process of finding a better way to do it next time. The results are shown in Display I.

The first two groups of interpretations shown in Display I consist mainly of evaluations of practice, mostly negative, unaccompanied by any ideas for what could have been done to prevent these errors. Those further down in the display include additional thoughts: a moral to the story, an idea for how the problem could have been corrected, or an intention to search further for an alternative strategy. Notice, however, that these additional thoughts appeared only about one-half the time. In the other half of the cases, they simply criticized their
**DISPLAY I. Conclusions from unsatisfactory experiences as a source of new ideas**

**Practice is acknowledged but failure is forgiven (N = 2)**

*Ms Awles:* I had intended on writing down on chart paper but didn’t … I forgot to. I did literally forget to put it down but then … but as I looked at it I thought there wasn’t enough time to do it anyway. I mean it was just more of a verbal getting them to read their stuff and go back to it. I could still do some chart paper writing but at that point most of it was just trying to keep them engaged and asking questions giving their facts and opinions.

**Practice is criticized but not corrected (N = 7)**

*Ms Mines:* And actually what I asked them to do to be thinking at this point of things that they could be writing about. And then while they’re thinking in fact I’m interrupting them. And so I needed to have given them maybe quiet think time without me interrupting. Couldn’t keep my two cents worth out.

*Ms Taffner:* It’s just that I’m usually a good speller, and I needed to spell that word right, and I needed to know how to spell it, because I had written originally ‘sp’ above it, as if to say, ‘I know, I realize that may not be spelled correctly’, and then I walked back to my book and had to look because I needed to know how to spell that word right then, I couldn’t just leave it with the spelling error. It was in me, that I needed to go back and fix it. Not that it was a mistake on the board, but just that something within me couldn’t leave it.

**Practice is criticized, moral to the story is formulated (N = 1)**

*Ms Lafayette:* One of the kids says here, ‘What did you want us to do?’ or something that made it clear to me that they didn’t understand what I was asking them to look for in these words. But I was using the word syllable, now some of them didn’t, it’s been a summer and you didn’t hear that word, probably. So maybe they didn’t remember what that meant or whatever. But sometimes I think we use language with kids and we assume they know what we’re talking about and I don’t think they knew what I was talking about. Or some of them might have, but some of them didn’t.

**Practice is criticized and mentally corrected (N = 5)**

*Ms Masters:* Because the nature of me wanted to get onto the new, I was just trying to run over [the old material], And so that forced me to, unconsciously, to fast-pace this. And now if I had to do it all over again I would have them speak and come up with something. I mean I wouldn’t assume that I had to give them an answer and go onto the next, and that was what I was doing. I was giving a lot of the information out.

*Ms Snyder:* I felt it would’ve probably been more farsighted to have used an overhead in explaining this business with enlargement. I hadn’t anticipated how difficult it was going to be or how I probably needed to do more of the lead-in to it when I realized that I was going around and having to talk to so many people individually … I wondered afterwards if I had started out with an overhead and I had started out by describing what the lines meant that were around the seal if people would understand better what all those lines meant if it didn’t look confusing to them or if they didn’t need some practice in advanced to that …

**Practice is criticized with plan to seek a better strategy for next time (N = 2)**

*Ms Awker:* I didn’t feel like the transition was smooth. And I wanted—if every time I take three, four minutes to move into something then by the end of the day, you know it’s 30 minutes that I’ve wasted changing. And as I watched it I just wondered how I could do that more smoothly. A lot of it is the group of kids that I have, but maybe I need to figure out a new way to transition them from one activity to the next.
performance without any further analysis of what the problem was or what could be done about it in the future.

These teachers’ examinations of their own practices, then, give us some ideas about what and how teachers learn from their own experiences—that is, how experiences can help teachers generate ideas to improve their practice. But not many self-critiques led to new ideas. In fact, only about one-half did.

Summary. These data, combined with other findings shown earlier, suggest the following conclusions about the role of craft knowledge in teaching:

- Craft knowledge derives mainly from experience, but can derive from numerous other sources such as newspapers and magazines, advice from colleagues and friends, etc.
- Craft knowledge mainly helps teachers address concerns about student willingness to participate and orderly task progress.
- Acquisition of craft knowledge is motivated largely by dissatisfaction with events and a desire to not repeat the same mistakes again.
- However, new ideas for correcting these perceived mistakes are generated for only about one-half of the episodes that are critiqued, so that the potential to learn from experience is somewhat limited.

People who believe that teaching is best learned in the doing should attend closely to these features of craft knowledge. For instance, the fact that craft knowledge is drawn on mainly to address concerns about student willingness to participate or to address concerns about orderly task flow suggests that it is not used as often to address concerns about how to foster student learning. In fact, Table II suggests that only 13% of references to craft knowledge concerned fostering student learning. Second, improvements are motivated mainly by dissatisfactions with how things went, not by satisfaction; so that if teachers are satisfied with their practice, we cannot expect them to learn much from it. And third, even when teachers were dissatisfied with their experiences, they generated ideas for improvement in less than one-half of the cases. So the potential to learn from experience is limited to (a) less than one-half of the experiences, that (b) teachers are dissatisfied with. So while craft knowledge in general, and experience in particular, are important sources for new ideas, we cannot expect experience and craft alone to yield the kinds of improvements that many critics of education want to see.

Prescriptive Knowledge

Table II has already shown us that teachers’ mentioned sources of prescriptive knowledge most often when thinking about content coverage and student learning goals. The most frequently mentioned specific source of prescriptive knowledge was tests and accountability systems. A few teachers described ways in which they deviated from these policies, and a few described their frustration at the pressure that accountability systems introduced, but most teachers accepted
testing and accountability systems as appropriate guides for the content they would teach.

The tenor of their comments also suggests two other points about teachers’ responses to institutional prescriptions. First, these teachers felt a strong sense of responsibility to ensure that their students learned the things their districts or states had outlined, and to ensure that their students would succeed on the tests that were prescribed. At the same time, there was a sense that both the teachers’ knowledge of prescriptive policies, and the policies themselves, were transient. Teachers often contrasted their current school with another school where they had worked earlier in their career, or they described recent policies in this school with earlier policies in the same school. Sometimes these comparisons were accompanied by statements that they preferred the old way or the new way better, but often they described them as simply different ways of doing things. For instance, Ms Awkler had this to say about a new textbook:

So we have a new textbook adopted this year, which does things in an entirely different order. And this year the county’s doing our local diagnostic in a little bit of a different order. So we have a new math curriculum and they have a time line for that curriculum. And we’ve looked at that time line as a grade level (there’s five of us) and we decided at the beginning of the year, even though it goes, it’s a little different from the way we’ve taught things, to follow that time line and just to see if we like it better to see if it, to see how it works.

Moreover, even though most teachers indicated a complacent acceptance of institutional prescriptions, their discussions often made it clear that they interpreted these prescriptions in light of their own prior beliefs and values. Often, teachers described policies that they had adapted for their own use, or that they had selectively accommodated. One gets the sense that they interpret policies as providing guidance rather than mandates. Display II provides some examples of the tenor of these remarks.

So teachers accept prescriptive guidance, but are not particularly committed to it. In fact, one gets the sense that they are not really learning from prescriptions in the same way that they learn from craft knowledge. Instead, they acknowledge prescriptions as guides for today, and expect that these guides may change tomorrow.

Summary. This examination of the ideas teachers acquire from prescriptive sources, and of how these ideas influence practice, tells us the following:

- Prescriptive knowledge often derives from tests and accountability systems, but can also derive from other sources, including textbooks, curriculum frameworks and various other local policies.
- Prescriptive knowledge is invoked mainly to address concerns about what to teach or what students should be learning.
- Acquisition of prescriptive knowledge is motivated by a strong sense of re-
Ms Abundo: [Could you just decide to skip this unit?] You could do that. It’s up to the person I guess. But then that would be in your conscience because if you don’t do it, you’re making the kids lose out. Like let’s say science, you don’t like science but is it your decision to make? It’s up to the person, basically. But there are some things that don’t fit or sometimes don’t really make sense and maybe we’ll decide that maybe the kids don’t really need that. We do that sometimes.

Ms Aires: [Do you always take your curriculum materials pretty much from the standards?] No. I mix and match, really. Except for like, a reading program, I do it really—we follow it pretty much straight from the book. [Why is that?] That’s what we’ve been told. That’s what they want us to do.

Mr Joiner: I don’t want my students to come out of my class, go to seventh grade, and I don’t want a teacher say, ‘Uh-oh we have Mr. So-and-so’s students. They didn’t learn what they were supposed to’. I want my students to come out and have the teacher in seventh grade say, ‘All right, we have Mr. So-and-so’s students and we know that they’re going to be on grade level or above’.

Ms Knutson: [Why can’t you spend more hours setting up?] Pressure from the state, the district, the government, you know. ‘These are the standards that you will teach. The kids will know this, this and this in the fourth and fifth grades’. And you’re completely and totally accountable to that. And I’ve struggled with this ever since I started teaching. Kids are going to get more out of an enjoyable classroom climate where you’re not so like ‘Oh, 45 minutes, time’s up, lesson over, pull out your math books’. And yet honestly I have to teach 40 minutes of ELD a day, 50 minutes of math. 100 minutes of PE a week. It comes down to this.

Ms Fosnot: I think probably my ideas have changed on that a lot lately. Um, our particular state has begun a math assessment, and in the lower grades, we’re being held more accountable for what we’re teaching in the lower grades, and I worry about what my kids get, and what they don’t get. I’m not the type of person that says, ‘They’ll get it next year’, or whatever. I’m constantly worrying that my kids are getting it or not getting it.

Mr Jaspers: I will say that I have a higher tolerance for [noise, movement, etc.] than you will find in other classrooms. So teachers might walk into my classroom and think there are moments of chaos going on, where I see moments of expression, but I guess the danger in that is I do have a mandated curriculum of topics that must be covered, subjects and things that must be taught, skills that must be learned, so you have to just make that judgement call.

Responsibility to ensure that students learn whatever content is required, so that they will be prepared for their future courses and so that they will be successful on required tests.

- However, interpretations of prescriptions are filtered through teachers’ own prior beliefs and values, and may be interpreted differently than reformers intend.
- Moreover, prescriptive knowledge tends to be transient, as teachers change their institutional homes, and as districts or states change their policies.

Reformers who look to institutional prescriptions as an avenue for improving teaching practice, then, need to bear in mind that prescriptive knowledge is always filtered through the teachers’ own prior beliefs, so that interpretations of
what the policies and rules actually say can vary from one teacher to the next. Moreover, it is not clear that teachers actually learn from prescriptive policies as much as they simply adapt to them in the same way that a driver adapts to construction activity alongside the highway. In this sense, learning from prescriptions is very different from learning from the craft itself, where teachers are highly motivated by their own dissatisfaction with how things went. Teachers do not respond to prescriptions out of any particular dissatisfaction, but rather as a matter of adjusting to a changing environment and a sense of obligation. As policies change, teachers change with them, but their commitment to prescriptive changes is moderated by a perception that prescriptions are transient.

Systematic Knowledge

Although systematic knowledge was slightly less often mentioned as a general source for ideas about teaching, one particular source of systematic knowledge, professional development programs, was the single most-frequently mentioned 'specific' source of ideas. When teachers referred to ideas from systematic sources, it was most often in the context of a concern about how to foster student learning. DisplayIII shows some of the teachers’ comments about what they learned from professional development programs.

Teachers’ references to professional development suggest that its influences, although uneven, had the potential to be dramatic. Teachers referred to programs they had participated in years earlier that still influenced their thinking in specific and definable ways. When they talked about these experiences, they were more emotionally committed to what they had learned than they were when they talked about prescriptive sources of ideas or even to craft sources of ideas. One of the most dramatic was this story told by Ms Toklisch, who had been teaching for 6 years when she enrolled in a summer workshop on teaching mathematics. Following the workshop, a mentor came to her classroom to observe her teaching and to help her change her practice. One day, the students were learning to measure. They were measuring their own height, but instead of holding the rulers against a wall, they moved the rulers up their bodies, jagging in and out of curves and lumps in their clothing. Toklisch saw that their measurements would be wrong, and tried to correct the students, showing them how to hold the rulers, when her mentor stopped her. The mentor took her out into the hall and strongly suggested that she needed to let the students figure this out for themselves. Then the mentor took over the class and finished the lesson herself. Toklisch watched as the students reported out their findings.

Somebody said, ‘Well I’m the same height as you but your measurement says you are 20 inches taller than me. That can’t be right’. And so Mary said, ‘Well why don’t you show the way you measure?’ And they showed the way—And the kids went running over and said, ‘But look what’s happening when you’re going up and over your hips and up over your shoulders … you’re adding a whole bunch of extra.’ And ‘Oohhhh-
Ms Joiner: [Where did you come up with this ‘draw, dream or read?’] Actually I got that out of 20th Century Leadership. [This is the same program you mentioned earlier?] Yeah this a program, a district sponsored program. And I just got—Like I said, I really buy into it. I use the program. And it’s worked great.

Ms Snyder: [Where did reciprocal teaching come from?] Well I took the training about 2 or 3 years ago and I’ve been able to use it in my other school, my other assignment in the same way. I think it’s a really good tool to use with cooperative groups and to use with teaching all those things that go into ...

Ms Chalmers: [Over your career, as standardized tests have changed, I’m wondering if your, if the way in which you thought about students gaining access to the right answers has changed?] Yeah. Very much so. I participated in a group about inquiry science. I think I mentioned before, and we talked a lot about scaffolding, and we’ve talked a lot about the powerful questions. I think of it as the hook to get the kids starting to question and to think.

Ms Buford: [Have you always worried about that?] Years ago, I [participated in a program] called ‘Teacher Expectations, Student Achievement’. And that made me very aware of calling on a variety of students. It made me very aware of how I answered their questions. It made me much more aware of not just brushing over if they gave an incorrect answer. It made me aware of the wait time. Those things really stuck with me.

Ms Majordom: [So what brought about that kind of change?] I’d say about maybe fifteen years ago we had something that the school system did called ‘Elements of Instruction’ and I just felt that was so useful and so helpful to me, and it was just a lot of things that I was doing, but it just kind of brought it all together and gave a language to it, and I just think that helped me an awful lot to focus more on, What is my objective, really, that I’m trying to do here, and how am I going to move the kids in this direction? So I really feel that course … certainly had a big influence on my thinking.

hhh’, they said. And that was so much more powerful than what I did. So much more. Because she just let them make mistakes, and then they saw the mistakes themselves. And then they started to question each other. It was so much more powerful.

I think that was the day I think I went home and cried. I went, ‘Oh my gosh. This is bigger than I thought it was. This is a major change’.

At the same time, the reasons teachers enrolled in professional development programs were ambiguous. That is, they were not motivated by an obligation to ensure that their students learned specific content, as they were when they acquired prescriptive knowledge, nor were they motivated by dissatisfaction with their practice, as they were when they sought craft knowledge. Instead, they enrolled for casual reasons: a friend recommended the program, they needed to fulfill a requirement, or the schedule fit their needs. There was a sense of happenstance or capriciousness in teachers’ participation in professional development. Moreover, the ideas teachers got from professional development were wildly different. Some programs promoted ‘effective teaching’, while others
promoted ‘constructive teaching’. So while professional development apparently has the potential to greatly influence teachers, its content is not reliable and access to it seems to be haphazard.

Summary. As a source of ideas, systematic knowledge also provides a unique contribution to teaching, different from the contributions of experience and different from the contributions of the institution. Our examination of systematic sources of knowledge tells us that:

- Systematic knowledge derives mainly from professional development courses, but can also come from journal articles, professional associations and the like.
- Systematic knowledge primarily addresses concerns about fostering student learning.
- Acquisition of ideas from systematic sources does not derive from any particular motivation, as does the acquisition of craft or prescriptive knowledge.
- Systematic knowledge can have dramatic and enduring effects on practice.
- However, the ideas teachers gain from systematic sources are uneven and even contradictory, and the likelihood that new ideas will be acquired is not certain.

Those who seek to improve teaching through professional development programs can be optimistic about the potential of such programs to have deep and lasting effects on teachers. However, these programs appear to be almost randomly distributed and their effects are unpredictable. The courses we heard about during this study represented many different approaches and theories of learning, and they advocated very different instructional approaches. And there were easily as many teachers who perceived very little benefit from their professional development as there were teachers who perceived large benefits.

Discussion
Virtually every teacher we talked to described ways in which their practices had improved over time, and they acquired new ideas from all three sources of knowledge. Some were tiny ideas, as when one teacher’s brother suggested that she use a bell to get student’s attention since she did not like having to raise her voice. Others were big ideas, as when Ms Toklisch encountered a completely different way of teaching mathematics. All were important to teachers because they led to changes in practice that teachers believed were improvements. The evidence I have presented here suggests that all three sources of knowledge are uniquely valuable to teachers, and that each has unique drawbacks as well. In fact, teachers regularly blend all three sources, as comments such as these suggest:

*Ms Snyder:* When I started out I right away knew that I needed to learn more about teaching reading. Then I realized as time went on that reading wasn’t very fun or it wasn’t very interesting, as it was happening back, say, in the ’60s or the ’70s. As time went on, I got little tricks here and little things there, but one of the things that helped me more than
Table III: Role of different kinds of knowledge in teaching

<table>
<thead>
<tr>
<th>Source of knowledge</th>
<th>Craft</th>
<th>Prescriptive</th>
<th>Systematic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristics</td>
<td>Idiosyncratic, intuitive</td>
<td>Certain, assertive</td>
<td>Conceptual, analytic</td>
</tr>
<tr>
<td>Primary source</td>
<td>Experience</td>
<td>Tests, accountability</td>
<td>Professional development courses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>systems, texts</td>
<td></td>
</tr>
<tr>
<td>Area of concern</td>
<td>Orderly task flow,</td>
<td>Content coverage</td>
<td>Methods of fostering</td>
</tr>
<tr>
<td>most often</td>
<td>student willingness</td>
<td>and student learning</td>
<td>student learning</td>
</tr>
<tr>
<td>addressed</td>
<td>to participate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acquisition</td>
<td>Dissatisfaction with</td>
<td>Sense of responsibility</td>
<td>Casual interest, availability</td>
</tr>
<tr>
<td>motivated mainly</td>
<td>particular episodes</td>
<td>to students and community</td>
<td></td>
</tr>
<tr>
<td>by</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact on teacher</td>
<td>Incremental, cumulative</td>
<td>Transient</td>
<td>Range from trivial to enduring and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>dramatic</td>
</tr>
</tbody>
</table>

anything else was when I got my counseling credential because I think it really did reinforce some of the things that I knew already about learning periods and learning problems and what you can’t just tune out or what you can’t dismiss as far as the things that need to be taken care of before you can get into the story or into a math lesson or anything else.

Ms Chalmers: I participated in a group about inquiry science, I think I mentioned before, and we talked a lot about scaffolding, and we talked a lot about the powerful questions. I think of it as the hook to get the kids started to question and to think. In the process of doing all that, I’ve developed in my thought of how to question. Because it’s an ongoing thing. It’s not something that you just learn how to do. You just sort of practice and continually practice.

Table III summarizes some salient features of each source of knowledge.

The present study suggests that none of these sources of ideas would be sufficient alone. While teachers often mentioned experience as a source of knowledge, I found many episodes where teachers criticized their practices but made no apparent effort to examine the problems and generate ideas for how to improve. Conversely, I found evidence that teachers responded more directly and rapidly to curricular guidelines than to other sources of knowledge, but also that they interpreted these guidelines with remarkable latitude. Finally, I found evidence that professional development led to the most dramatic changes in teaching practices, yet the professional development programs teachers referred to were remarkably diverse and appeared to have similarly diverse responses.
from teachers. Moreover, participation in professional development programs appears to be a casual endeavor, not motivated in the same way that teachers are motivated to attend to craft and prescriptive sources of knowledge.

I draw two lessons from this examination. One lesson is that outside sources such as professional development and institutional prescriptions can have very strong and powerful influences on practice. If these two outside sources of knowledge—systematic knowledge and prescriptive knowledge—are combined, they account for roughly two-thirds of all teachers’ references to new ideas. This is substantially different from the influence these sources are often presumed to have. In fact, their primary weakness appears to be not in the content or format, but in the unevenness of what they offer. Institutional policies are transient and continually changing, and teachers consequently adapt to them more than learn from them, at least if we define learning as an enduring change. Professional development courses reflect many different theories of teaching and learning, and teachers’ exposure to them follows no obvious pattern. If either of these sources of ideas were more internally consistent and consistent over time, it would provide teachers with far more coherent guidance than it currently does and might have the potential to have far greater impact on practice.

The second lesson I draw from this evidence is that considerations of one kind of knowledge do not necessarily invalidate either of the other kinds of knowledge. Efforts to improve the coherence of policy prescriptions, for instance, do not imply that other kinds of knowledge have no value. Indeed, if anything, policy prescriptions depend for their success on other kinds of knowledge, for they do not address all of the areas of concern that are important to teachers. Similarly, efforts to improve and enhance teachers’ systematic knowledge do not necessarily imply a lack of respect for, say, craft knowledge, nor should efforts to identify and define teachers’ craft knowledge imply that teachers have no need for systematic or prescriptive knowledge. Scholars who study teaching have devoted much energy to sorting out the merits of these different kinds of knowledge, and they have often argued that one or another of them is inherently superior or inferior to the others. As Hargreaves (1996) has noted, sometimes the fostering of these polarities is politically motivated as different groups attempt to claim ownership of important knowledge. But they do not help us learn how to help teachers.

What is needed is an integrated theory—one that acknowledges all of the sources of knowledge that contribute to practice and then examines how these interact to create particular teaching practices. Michael Huberman strove for such a theory when he articulated his concept of the independent artisan. Although he recognized the importance of craft knowledge, Huberman did not suggest that craft knowledge represented all there was to know. Instead, he devoted a good deal of his career to examining ways of bridging the gap between research and practice, finding ways of fostering constructive growth in teaching, and of enabling teachers to better themselves. He recognized the importance of all of these kinds of knowledge, sought to understand each of them, and sought ways to help teachers integrate them. We can profit from his example.
Acknowledgements

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Note

[1] Since the study consisted only of single visits, I have no independent basis for confirming the changes teachers described, nor for seeing if other changes may have occurred that the teachers did not mention.

References


