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Working with Teachers: Practical Suggestion Stimulates Teacher's Self-Reflection

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During my recent doctoral study, "Collaborative Action Research for Science Teachers' Pedagogical Content Knowledge Enhancement," I was surprised (yet enlightened) by an unexpected experience that convinced me of one of my, then, newly acquired beliefs: make suggestions to help teachers to test them out. My new belief emerged while I was researching literature on the role of a researcher as a mentor. I came across an excerpt by Katz (1993, 2):

When suggestions are made in terms of what to try "next time," the likelihood of humiliating or embarrassing the teacher about the incident just observed is minimized. Some in-service educators are so eager to get teachers to analyze their own "mistakes" following an unsuccessful teaching episode that they might inadvertently embarrass them, which in turn could undermine the teachers' dispositions to go on learning, trying, inventing, and seeking the best methods for themselves.

Background to the Experience

Since the early '70s I had been working with teachers as a teacher educator, providing them with suggestions for their growth. However, Katz (1993) made me realize that I had not been questioning the nature of my suggestions from that perspective. I was

eager to have teachers analyze their mistakes immediately following an unsuccessful lesson or episode after I pointed out their mistakes to them. I wondered how many teachers I had embarrassed and constrained from reflecting on their own practice for growth in the past. I commenced my fieldwork in Karachi, Pakistan, with this new insight. For my study I worked with three in-service science teachers who had successfully completed a one-year diploma program in science education from the Aga Khan University Institute for Educational Development, Karachi, Pakistan, in 1998. The university is a nongovernment, not-for-profit organization that works in collaboration with the Pakistan government and has a vision to be instrumental in the education reform and improvement in Pakistan. Since 1993, the institute has offered various inservice field-based teacher education programs that emphasize reflective practice and constructivism for change in teachers' classroom practice to improve the quality of learning in Pakistan classrooms.

The one-year diploma program in science, also referred to as Subject Specialist Teacher (SST) program, is one of several programs the institute offers. I coordinated and facilitated the first science diploma program between July 1997 and June 1998. The program's distinguishing feature was to have teachers

reflect on their practice through success stories to help them improve and develop a personal conceptual understanding about their classroom practice. Edwards and Knight (1994, cited in Farmery 2002, 105) support the approach in which “effective teachers reflect on their teaching and modify their teaching on the basis of their reflection ... that invariably leads to improved practice.” The following teachers’ observations of the process are testimony to this (Pardhan 1998):

I also observed that many weak students were able to complete their work in the given time, which was a good achievement.

Science teaching and learning can become very interesting if science teachers give demonstrations and then involve students in performing experiments, which can then lead to better understanding and retention of different topics.

There was a change in my teaching after attending this program. I realized that now I can give the students better teaching and better ways of conceptual understanding. I also noted that students were taking a keen interest in the activities.

My experience with this program made me believe that my research participants will take the initiative to reflect on their classroom practice at the start of the exploration stage to identify their concerns or areas for improvement. This allowed me to work together with the participants to reflect and plan at higher levels of comprehension, take more purposeful actions and simultaneously enable the participants to gain a sense of ownership. Because my participants were exposed to reflective practice and made it part of their practice during the diploma program, I assumed that they had continued to do so. However, a visit to a participant’s classroom made me question this belief and alerted me to resist “telling” and instead make suggestions in accordance with Katz’s thinking. Here I will share my experience and learnings through select descriptions and interpretations of my first classroom visit.

Classroom Observation

The participating teacher (PT), her coteacher, the students and I (R) were present for the one-hour lesson. The coteacher was

new and recently attended the eight-week Visiting Teacher (VT) Program at the Institute for Educational Development. She taught a parallel section of class II and was expected to learn from the PT. In the pre-lesson half-hour talk in the PT’s school staff room, the PT shared her lesson plan with me (field observations and notes):

Pre-Lesson Talk

Key: researcher (R), participating teacher (PT)

R: Please tell me about your lesson.

PT: Materials have weight. I am also going to teach mass.

R: What else would you like to tell me?

PT: I will give them materials in groups. They will have to sort which can be measured in litres and which in grams. They will then write in copies.

R: Anything more you would like to tell me about your class other than what you will teach?

PT: They are sitting in groups (quiet). (conversation transcript)

As our conversation continued, the following exchange ensued:

R: When you teach matter like you will today, do you make links with previous term’s topics?

PT: Yes, food.

R: Can you give me an example?

PT: Today’s activity has wrappers, for example, chips, biscuits and so on. They will have to find out which of these things has to be measured in grams and millilitres. I am going to give them cans, for example, cola and small juice bottles.

R: Any other way in which you will make connection with food?

PT: No, today I am to do only this. (conversation transcript)

From the pre-lesson talk, I inferred that the lesson was about the concepts “mass” and “materials have weight.” The students were to learn through group work by sorting the materials in two categories, namely, materials measured in litres and materials measured in grams. The PT had no lesson plan or resources with her; however, as we got up to walk over to the classroom, she picked up a plastic bag from a cupboard with some stuff in it.

Classroom Experiences

During the lesson, the teacher did not refer to any notes or lesson plan. The lesson began with recall of the textbook definition of *matter*: “matter has mass and occupies space” (field observations/notes).

Key: individual student (S1, S2, S3), all students (SS), participating teacher (PT), researcher (R)

PT: What is matter?

S1: There are three states of matter.

PT: I have not asked about states.

S2: Miss, anything that is like stone.

PT: (no response to the S2’s answer)

Anything that has . . . (expecting students to respond) (students quiet or some talking). What it has . . . Sara, what it has . . . (no response from Sara) . . . Anything which has mass and occupies space . . . now say together . . .

PT and SS: (in chorus) Anything that has mass and occupies space (repeat a couple of times).

PT: What are three states of matter?

SS: (almost all in chorus) Solid, liquid and gas.

PT: (repeats) Solid, liquid and gas . . . can you give me examples? (lesson transcript)

The PT stayed near and mostly faced the chalkboard. Students at the back of the class were talking and doing their own thing. The PT wrote *solid*, *liquid* and *gas* on the chalkboard and walked to a student in front expecting an answer. A short dialogue took place. (field observations and notes)

S3: Sui Gas (local name for natural gas used as an energy source by most households).

PT: Very good (goes back to chalkboard and writes Sui Gas under gas, writes her own examples under solid and liquid, and then erases everything). (lesson transcript)

For the first five minutes of the lesson, the teacher did most of the talking. She spoke too fast and expected quick standard answers from the students. Students in front of the classroom were paying some attention. The rest were doing their own thing—looking around, fidgeting or just sitting idle.

For the next seven minutes, students were asked questions about shopping for apples and milk, and the teacher managed to get a few students to say, “We buy apples in kilograms and milk in litres.” Simultaneously the

teacher kept writing and erasing on the board. Finally the PT made two columns: kilogram/gram/milligram/pau and litre/millilitre as headings (note: *pau* is a local unit for 250 grams). She suddenly turned to the class and said, “Now I will give . . . you (students) will have to be careful. . . .” She leaned over a table by the chalkboard and picked up the plastic bags that had stuff in them. The coteacher, who had been standing in the front left corner of the class all this time, helped to pass the bags. The teacher randomly gave away items (including sheets of paper to write on) tied in plastic bags or loosely. Students started talking, reaching for items or almost snatching items. Some girls held on to items for themselves. The noise level went up, and the teacher mostly stayed in front of the class with one group in particular, facing away from the rest of the class. For the next 15 to 20 minutes there was commotion in the class. Most of the time students were unsure as to what to do and seemed to seek the teacher’s consent. Students were heard asking questions but mostly low-level questions: “What is this thing? What do we write? Where do we write this?” Some students were reporting what another student had written. The teacher responded now and then and that too by telling rather than stimulating discussion. The teacher’s questions were mostly the low-level *what* and *where* type. Although *why* questions were heard at times, these were inadequately capitalized on to make students think or to get a satisfactory answer. The PT finally came to the students at the table next to me (R) and talked to the students (field observations and notes):

Students seemed to have difficulty with knowing what to do, reading and writing words, and understanding concepts. The student–teacher talk was mostly playing a guessing game, as this transcript segment suggests:

Key: teacher (PT), students (S1, S2 . . .)

PT: (pointing at a student’s work) This one here . . . write Coca Cola . . . what is this that you have written . . . (picks up a Coca Cola can).

S3: (pointing at writing on the can) This here is its name.

PT: Read it.

S3: Ko . . . kaa . . . ko . . . la.

S4: Teacher this (meaning the word *Coca Cola*) should come up here

(unlike most of the other students, this student had divided the page into two columns by drawing a straight line right across the middle of the page widthwise. *Up* meant the top half of the page).

PT: Why should it go up there?

PT: (mixed voices of students ... can only pick up some words ...)ko ... ka ... teacher ... ko ... teacher ... will go up (meaning top half of the page).

PT: Why would it be up?

S4: Teacher, it has air ... air is in it ...

PT: What comes in it?

S4: Yes, liquid comes in it.

PT: Yes.

S3: Teacher, solid ... solid ... Yes.

S4: Gee ... ram (attempting to read the word *gram*).

PT: Yes, it will come under gram. Very good. (lesson transcript/field notes: for sample transcript see Appendix 1)

The teacher spent the last 10 minutes trying to manage the restless class and, in the process, getting frustrated. The students seemed anxious for their snack break to be followed by recess. The noise level had risen; materials were still on the tables or on the floor. The teacher was trying to get students' attention. It was not working. (field observations/notes)

PT: (almost shouting) Now girls ... now girls ... what have you written? Say your answers ... (turns around to face the chalkboard and the students sitting on her right in front ...) under the column kilogram/gram. (Only the students in front got attention and made a few contributions. The rest of the students were moving around, talking or fighting. The teacher hurriedly entered five items for the litre/millilitre column. Only four minutes were left for the lesson. In an angry loud voice, she said, "I want you all to stop ... please bring all the things (only some students in front responded and walked up to hand the teacher some items ... the coteacher and the teacher moved around to collect items ... tried to settle the restless students eagerly waiting for the bell to ring). (lesson transcript/field notes)

Immediately after the lesson, I felt a strong urge to share my observations to seek for explanations from the PT about the why of many happenings. This was a reflection of my past practice that I needed to hold back and

instead listen to the PT's reflection first. This also allowed me to revisit the lesson by writing a personal reflection.

My Personal Post-Lesson Reflections

It was difficult to keep up with the teacher switching from English to Urdu or vice versa without any wait time. I wondered how much the students were able to follow and learn, particularly the concepts of weight and mass. I also questioned how many students were really reached. I observed that after a quick review, a recall of a textbook definition of *matter* and stating the three states of matter, the students were required to categorize the given samples of empty wrappings, cans, tubes and bottles into two columns: kilogram/gram and litre/millilitre by reading the name of the item and whatever unit was shown on the containers. (Some bottles were not quite empty, so out of curiosity students sprayed stuff at each other, poured, played with and tested the contents. They received inadequate instructions about safety or precautions in particular.) The students seemed confused and uncertain as to what they were expected to do. The teacher went around during the small-group activity to sort the items, repeating the same instructions most of the time and telling rather than stimulating discussion. I learned beforehand that the lesson was about weight and mass in materials. However, the lesson ended abruptly at 10:07 a.m. (The bell rang late on this day—at 10:07 a.m. instead of 9:58 a.m.). The students became impatient, and the teacher and coteacher struggled to keep them in their seats and silent. Only a handful of students contributed to the kilogram/gram column. The teacher hurriedly told the students what to write for the litre/millilitre column. Only a few students wrote one or two items of this information on their sheets; a handful of them made only columns with headings. I wonder why all this was happening? I hope that I will get some answers from our post-lesson talk and that I will learn more about what was happening and perhaps why and what can be done. I am eager to meet with the teacher and learn more (personal after-lesson reflection, Charan).

My eagerness turned into a dilemma during the post-lesson talk.

Post-Lesson Talk

Key: researcher (R), teacher (PT)

R: How do you feel about your lesson today?

PT: No ... (pause).

R: Try to think.

PT: I forgot to explain to them (students) about mass.

R: When would you have done that explaining?

PT: In motivation during explanation . . . just after motivation. Then I should have told them we measure in mass . . . if solids in kilogram and if liquid then in litres. (misconception in unit of mass)

R: Anything else you can think of?

PT: No, after that it was that activity that was done.

R: Anything more?

PT: No, I am satisfied.

R: (Needed to think of an alternative to have teacher's input.) Suppose you were to sit down and think back to recollect today's lesson. Would you be able to describe events and talks with your students from the beginning to the end of your lesson?

PT: (no response . . . blank expression . . . R waited . . .). (conversation transcript)

I was stuck. Once again, I felt like sharing my observations and feelings about the lesson with the PT, which, as I reflected on afterward, had the potential of my telling rather than her acknowledging the areas needing attention. However, I reminded myself about Katz's suggestion and realized that I must think of some other alternative to help the PT to reflect on the lesson herself. In our pre-lesson talk, the PT had mentioned teaching a parallel lesson the following day. I suggested videotaping it so that both of us could view it independently and then compare notes and discuss them. The videotape would give us evidence or clarification if any discrepancies occurred. To my surprise, she immediately agreed to this and said, "It would be interesting. Let us see how one can remember things." We discussed the ethical considerations around videotaping her lesson. What surprised, yet delighted, me the most was that she agreed to write about her lesson toward the end of our discussion. Reflecting on this significant and concrete experience once again made me revisit Katz's words, and further strengthened my belief.

With the PT's knowledge and permission from her school head, the next day's lesson was videotaped. On subsequent days the PT made journal entries for the two lessons (see Appendix 1) and shared them with me. The PT's journal writing and viewing of her taped lesson contributed to her self-reflection. Furthermore, the PT's self-realization and identification of her problematic areas made it easier and more meaningful for us to engage in a joint reflection. It also paved the way for us to work collaboratively and take appropriate actions to address the concerns. I will conclude this article by sharing pertinent personal reflections, personal learnings and anecdotal evidence that support the turning point I witnessed in the PT as a result of alternative practical suggestions.

My Interpretations of the PT's Reflections

Journal Entry

PT's own description of the September 27, 2000, lesson concurred with my observations (see Appendix 1). Her reflection on our post-lesson talk drew my attention to the difficult and time-consuming task of a teacher attending to what children say and then revisiting and reflecting on it. PT's lesson description is predominantly a reflection of what the teacher said and did; that is, the focus is more on the teacher. However, as for videotaping the lesson, she had mixed feelings: "I am sure that the children will not be active because of the video camera. Let us see what happens tomorrow." Inherent in this teacher's concern, I see her belief that children should be active; however, I question her notion of active. To me it is at variance with active learning. It is a likely area to consider. The PT raised further ethical questions for me: "Will the video be kept confidential? Will it be shown to the other teachers?" Though we had previously discussed this, I reassured her that I am responsible for keeping the videotape just between the two of us and that, once my thesis is written, I will destroy it unless she decides otherwise. I reminded her of the mutual written consent as well. Despite all the questions, we ventured into the act of videotaping the parallel lesson on September 27, 2000.

At the start of the lesson, I introduced myself and the camera person to the class. The students didn't ask why the lesson was being videotaped, but I explained to them that the camera person would do his work and we would carry on with the lesson as normal. As soon as the PT began the lesson, they were not even bothered by the camera man's presence. My overall comment for the lesson read as follows:

Today's parallel lesson was pretty much the same as yesterday's except that teacher spent somewhat more time collecting examples of solids and liquids from students before starting the activity, gave more explicit instructions especially for grouping and social skills before distributing materials and at the end had input for items listed at least one from each group. (field notes Charan, September 27, 2000)

My field notes of the day's lesson were pretty close to those of the PT's observations. She had also noticed that once the students got into the activity, the camera did not bother them (see Appendix 1). She had an opportunity to test her hypothesis and change her thinking. Nonetheless, the sameness of the two lessons in my field notes and that of the PT's journal entries do not carry the same meaning. My sameness, unlike the PT's, includes the discrepancies as well. We still needed to talk after viewing the video.

Video Watching

The process of dialoguing, convincing, negotiating and making appropriate and timely arrangements for the videotaping finally enabled the PT to change her thinking. The willingness of the PT and the head was also necessary and for this change to happen. The change was from "I am satisfied" to self-identification and realization of four problematic areas:

- Questions that students did not comprehend. For example, when I (PT) asked them, "How much mass has the matter?" and "How can we measure it?"
- When I gave the students the shopping bag with materials, they started quarrelling with each other and I had a problem controlling them.

- When I asked them to "drop the pencils," (one of the few rules in class that the PT used to get student attention) some girls were not listening. I had to interrupt the conclusion and draw their attention.
- Finally, when I asked them to collect the things, they again started quarrelling with each other. (conversation transcript after viewing video, September 27, 2000)

Interestingly, during the conversation, a moment after articulating the above four problems, the teacher switched back to "I am satisfied" (conversation transcript, September 27, 2000). However, the teacher's own formulation of some of the problems helped me (R) to challenge the teacher and to reconsider her thinking. This further helped the teacher to admit to and give reasons for her anger:

PT: Teacher (meaning herself) gets angry easily. Teacher has much anger inside.

R: Why would that be?

PT: I don't know.

R: Let us go back to the video ... when did you get angry?

PT: When students were working in groups ... and when I asked them to drop their pencils ... this is when I get really angry but I do try to control ... also when students were talking very loudly. (conversation transcript, September 27, 2000)

Though the teacher picked up questioning and social skills as areas of concern, the discrepancy between her conceptual understanding of the subject knowledge and the children's ideas still went unnoticed. However, the flow of the dialogue gave me a natural lead into probing, discussing and informing her about the understanding of science concepts involved, namely, mass, volume, the units in which these are measured, and that water is a special liquid of which one kilogram happens to have a volume of one litre. Thus, though the volume of water may be measured in litres, the amount may be stated as one kilogram of water. This, however, does not work for all other liquids, for example, milk. Amounts of solids in the SI-system are normally measured in kilograms, grams and milligrams, and amounts of liquids are commonly measured in litres and millilitres. At this point I thought it appropriate to share some of my observations about the children's ideas:

On two specific occasions during the first lesson the girls were sorting items, they were thinking ahead and questioning. The girls wanted to write the empty Coca Cola can under litre/millilitre because they said it had air in it. I thought it was clever thinking. Air, a gas, comes under fluids (liquids and gases). For this group of girls, air was more like liquid than solid, and it fit in the litre/millilitre column. For the toothpaste, the girls debated where to place it. One girl even said it was a gas. From the looks and feel, toothpaste is not like a solid or liquid. Unfortunately it has been a tradition to think that things can be categorized in three clear-cut states. However, some things do become problematic, for example, toothpaste. I was amazed that the girls thought about it. Because some of the tubes of toothpaste had ml as the unit, the girls inferred it as a liquid. Children bring their own knowledge to the class and activity. This reminds me of one other moment in the second lesson when girls were asked, "What do you say when you go to buy milk?" Some girls responded, "Give me one kilo milk," which was not the answer you had expected. The shopkeeper near my place sells milk by kilos. These girls probably had that experience. It is interesting how students come up with unexpected answers. It does indeed make teaching challenging and at the same time interesting. (conversation transcript, September 27, 2000)

Our discussion after having videotaped the lesson clicked a turning point in my participating teacher's thinking. Yet I was concerned:

Though I sense a turning point in PT's thinking after today's talk, I worry about PT's words, "Teacher has much anger inside." I must pay attention and be sensitive to this as I proceed to work with PT for the rest of the project. This must not affect her professionally. (Charan's journal entry, October 2, 2000)

At the end of the session, the PT's response to my request for the two lesson plans, the children's work and a suitable day and time for sharing the planning of the next lesson was, "Lesson is the same ... give me time. Children's work ... needs time ... two to

three days. Call after 9 p.m. ... because I need time with my daughter before that." I was pleased that the PT did not just accept my request, but expressed her requirements as well. This was a new beginning to the project's next collaborative-action stage. During this stage we coplanned and cotaught several lessons using the systematic and cyclic process of planning-acting-evaluating/reflecting-replanning-acting and so on. The PT appreciated and acknowledged the benefits of our joint deliberations in a group session:

We (R and PT) planned and taught, and changed and added many new activities ... concept is the same but the activities changed like Ms. Charan (R) had suggested ... Some challenging activities were given to the children and you (meant for the group) know how our children make noise ...but when we gave them the activity, children were really involved in thinking to a level that ...there was no noise at all in the classroom for some time ... Or we can say that there was an optimum (acceptable) level of noise because whatever children were discussing was according to the task given to them. Children didn't quarrel ... I was amazed and impressed ... I think activity should be challenging because sometime we underestimate children and assume that they will not be able to do what we are going to do in the classroom, but I now realize that activities should be challenging, and we should not underestimate children. We didn't have to face discipline problems where we always have to say keep quiet. (group session transcript, December 1, 2000)

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Appendix

PT's Description of Lessons, September 26–27, 2000

Today's lesson: Materials have mass

I started the lesson with revisiting previous lessons and asked the following questions:

What is matter?

Students didn't respond.

Then I asked them again, but I told them "anything which has mass and occupies space is called matter."

Then I asked, "How many states of matter are there?"

The answer was, "There are three states of matter: solid, liquid and gas."

Then I asked them,

"When you go to buy something (apples), what do you say?"

Key: Individual students (S1, S2), teacher (PT)

S1: Give me 10 apples.

I: Can we ask for 10 apples?

S2: Please give me 1 kilo apples.

I: Yes we ask for 1 kilo apples.

PT: What when you go to buy milk?

S1: 1 kilo milk.

I: Can we buy 1 kilo milk?

S2: No, 1 litre milk.

Then I explained that things that are solid are measured in kilograms, grams or milligrams, but liquids are measured in litres or millilitres.

Then I gave them instruction, "You have to make two columns. Write in one kilogram/gram and in the other litre/millilitre. Now I'll give you some wrappers and cans. You have to sort out which of these things are measured in kilograms or grams and which in litres or millilitres and write them under correct headings. At the end, I asked what they had written from each group for kg/g and then for L or mL. With this I ended the lesson.

Reflection

It is not easy to remember all the things that children said, and it is difficult to do it immediately. It takes time to recap all the events. But I have written what I've remembered from today's lesson. Regarding video recording lesson, I am not sure how the children will take it. They will probably not be active; I am not sure about it. Let us see what happens tomorrow. There are questions that are bothering me.

- How will the confidentiality of the video be kept?
- Will it be shown to other teachers?

Videotaped Lesson, September 27, 2000: Materials have mass

PT's description from her journal.

Topic: Materials Have Mass

Class: II (parallel section to yesterday's one).

I revised the previous lessons, and started the lesson asking,

"What is matter?"

Then I asked states of matter and examples of each state. I asked the students if we buy milk, how would we ask for it. One student said, 1 kg but others said 1 L.

Then I explained that the solids are measured in kg/g and liquid in L or mL. We measure the amount of mass if it is solid in kg/g, but if it is liquid in L or mL. Then I gave the same activity as yesterday's.

As this lesson was videotaped, I thought that the students will not respond, but when they started doing the activity, the camera didn't even bother them.

Today's lesson was different from yesterday's because

- I made four groups.
- I explained that mass can be measured in kg/L.

It is similar to yesterday's in that the activity and the conclusion were the same.