A CO-LEARNING PARTNERSHIP IN MATHEMATICS LOWER SECONDARY CLASSROOM IN PAKISTAN: THEORY INTO PRACTICE

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My research involves studying mathematics teachers 'classroom implementation of their learning from an 8 weeks in-service course at a university in Pakistan. In this paper I discuss my learning, resulting from participation in collaborative work with teachers in my research. I performed two roles: the role of teacher educator supporting teachers' trying out their new aims of teaching in the classroom and also the role of researcher collecting data during the teachers' engagement in their learning. I was also engaged in self-inquiry into my role as a teacher educator through my own reflection on the processes and issues of the teachers' learning as well as my participation in the two roles. The analysis of my participation in our collaborative partnership reveals that although I tried not to dominate, I recognised that my own ethical and theoretical perspectives of being a teacher educator in the Pakistani context made me react in ways that could be regarded as directing the teachers' thinking and behaviour. This became one of the major issues or tensions in my study. I was not aware of this issue until I experienced the reality of these teachers' practices.

As a doctoral student**,** I began this research as a study of how mathematics teachers' had implemented their learning into classrooms following their participation in an in-service education programme at a university in Pakistan. In the first phase, I adopted an interpretative stance in a phenomenological tradition in terms of understanding of teachers' classroom implementation of their learning following a university course. From Phase 1 I recognised that serious difficulties existed for the teachers in translating their learning from the university into activity in their classrooms. A need emerged on the part of teachers for support and guidance in the implementation of their learning objectives. In Phase 2, I, therefore, extended this research from a study of teachers' implementation strategies to a participatory study of processes involved in supporting teachers' learning and classroom implementation. In this paper I will focus on my own learning as a teacher educator and researcher.

THEORETICAL PERSPECTIVES

Wagner (1997) introduces the term of 'co-learning agreement' in research relationships between the participants in research. He discussed three modes of co-operation in educational research namely those of *data extraction agreement*, *clinical partnership* and *co-learning agreement*. The difference in these three forms of research relationship determines social arrangement, expectations of the participants, and implications of the research project. In a co-learning partnership, the research is seen as a more interactive social approach for the educational reform process. As Wagner states:

> In a co-learning agreement, researchers and practitioners are both participants in processes of education and systems of schooling. Both are engaged in action and reflection. By working together, each might learn something more about the world of the other. Of equal importance, however, each may learn something more about his or her world and its connection to institutions for schooling (p.16).

Jaworski (2000) extends the co-learning idea to the relationship between teachers and teacher educators, as well as between teachers and researchers. She states, 'A co-learning partnership implies an explicit arrangement agreed between participants (p. 6). According to Jaworski, the consequences of such a negotiation would be a growth of knowledge for both the participants (e.g. teacher and researcher, or teacher and teacher educator) with recognition and resolution of everyday dilemmas of teaching, and teachers' learning.

I inferred that a commitment for learning could be an activator in the sense that it engages teachers in taking actions on the basis of their self-critical reflection, resulting in creating change at a rate, which, is feasible for practical needs (Schon, 1983; Carr & Kemmis, 1986). In this perspective, I assumed that the teachers' engagement in thinking and dialogue about their actions, in the context of their classrooms for improvement of practice, would advance their learning about mathematics teaching. This is parallel to the perspective of students' learning in a mathematics classroom, students collaboration with a teacher, where both teachers and learners consult and respect each other's experiences and knowledge as well as question them in order to enhance learning (Povey and Burton, 1999). Thus, these were my own philosophical starting points in working with the teachers through which teachers and teacher educators might achieve status of learners within their respective roles. However, the theoretical position, which I adopted, became challenged in the realities of the teacher's classroom.

METHODOLOGY

I worked with three teachers in the second phase of my research. They had resumed their teaching after attending an in-service course at a university in Pakistan. However, in this paper I shall report on some aspects of the work in the second phase with one teacher. The data in this phase of research mainly involve field notes, audio-recorded conversations, in the pre and post-observation meetings, with teachers and my reflective journal entries. I met each of the teachers once a week, (from mid December, 1999 to Early August, 2001 in the second phase of the research) on a regular basis, although, sometimes it was twice a week if a teacher needed my support. I first analysed data from observations and conversations to characterise the teachers' learning and identify issues. Analysis of my own learning began with a review of the examples and issues arising from my analysis of teachers' learning (Mohammad, 2002). I listed the issues in three groups related to the teacher educator's engagement in the collaborative work, its outcomes and its tensions. I further listed the issues from my reflective journal entries regarding analysis of work on particular events. Examining each example closely, I identified key events that presented dilemmas for me as a teacher educator. These key events address the issues and tensions of my actions, their relation to my philosophy of collaborative partnership and the practical reality of school.

WORKING FROM MY THEORETICAL PERSPECTIVES

Conceptually, I believed that teachers would learn best by exploring their own issues and identifying their own needs with my support. However, from my wider set of analysis of examples, there were many events which involve issues where I (as a teacher educator, in response to the teachers' needs) intervened and guided the teachers' actions in a way that seemed at first contrary to my ideology of development of teaching in a co-learning partnership. Such examples also highlight the difficulties I experienced in promoting a shared sense of participation in a co-learning partnership with the teacher. These difficulties exemplify issues related to sensitivity in not threatening these teachers' self-esteem in my commitment of a co-learning partnership. I offer the following examples in order to discuss the constraints and possibilities of working together.

Example 1: Planning Percentages

In one pre-observation meeting, the teacher asked me to discuss how to teach 'percentages'. He said that he had been teaching the textbook exercises since he had started teaching, and did not have any alternative ideas. We began the lesson planning by reading the relevant content [1] of the textbook, because it was the only resource available at the school. When I asked him to share his understanding of the content, he could not explain anything other than the method in the book that multiplying a fraction by hundred converts to a percentage. It seemed to me that reading and understanding the content were two different issues for him. I shared some examples with him about using percentages in daily life (for example, examination grades, rates of tax, discounts) and the meaning behind that language. He said that now he remembered that percentage meant 'a part out of a hundred'.

The teacher then suggested that we needed to use some cards (or posters) for writing different examples from daily life, as he had used in his university course. He thought of different examples: 20% extra toothpaste, 50% off the cost, 2.5% Zakat [2] etc, so the students could discuss the use of percentages and explore their meaning. However, he then raised an issue about access to resources. There was no material at the school, nor was there any arrangement for hanging charts in the classroom. I encouraged him to think about other possible ways to present this idea in terms of daily life examples, but he could think of nothing other than making posters. I suggested he could present examples by writing on the board or by expressing them verbally in order to initiate the discussion. He assumed that verbal explanation would be unattractive for the students, while writing was time consuming:

> The writing could take more than 10 minutes, and in a 30-minute period, I do not think it is possible to teach a complete lesson. I do not think that verbal examples could motivate children to participate in the discussion. Children need stimulus; this is the beginning [to apply different methods] (6 Jan, 2000).

How to plan a lesson beyond the textbook was a demanding task for him. I asked him to think about introducing the topic by reviewing simple fractions. He responded positively to my encouragement and expressed an interest in learning but lacked the ability to initiate his thinking at this stage. He asked me how he could teach fractions and their relations to percentages as well as completing the textbook's exercise in the limited time

of a single lesson. I encouraged him further to think for himself. The teacher appeared frustrated by my further encouragement. He said 'I am here to learn from you'. My judgment of the situation was that the teacher's frustration might affect his behaviour so that he might not bring any change to his class. It was impractical to expect that he could explore new methods.

Example 2: Teaching Decimals

This was our last meeting in relation to our working together. In the pre-observation meeting the teacher said that his purpose was to teach the methods of converting decimals into common fractions and vice versa with reasoning. For this purpose, he had planned activities. However, the issue of the teacher's limited understanding of decimals was not disclosed to me during his sharing of the planning. In order to discuss my dilemma as a teacher educator in this example, I need to provide some details from the lesson.

The teacher wrote on the board: **.1 = 1** [I found it hard to understand what he meant here, but it became clear that it aided his idiosyncratic understanding of converting between fractions and decimals].

1 T You should remember that the decimal point always has a value equal to one.

He wrote a series of numbers on the board: **.1, .11, .111, .1111,**

2 T Observe the values of these numbers in common fractions.

*Firstly he considered '**.1**'*

3 T Write the number as a numerator. Remove the point from the number and write one as the denominator. Now count the numbers after decimal and put zeros accordingly in the denominator.

He wrote, $.1 = \frac{1}{10}$. *(His verbal and written explanations were going on simultaneously).*

He solved another question. He wrote, $.11 = \frac{11}{100}$.

4 T We can write this (*pointed to* **.11,**) in this way.

He wrote, $\frac{11}{100} = \frac{1}{10} + \frac{11}{100}$ [I think he intended to write that 1/10 +1/100=.11, which is another way to represent 11/100, but what he wrote was incorrect].

Then he called one of the students and asked him to write ***.111*** *in common fractions. He guided the student to solve the question correctly in a similar way to the previous examples.* (17 June, 2000)

The teacher had his own idiosyncratic way of thinking about the equivalence of decimal and fraction representations. He had given a mathematically meaningless explanation to the students; it seemed to me that he reasoned as follows:

- Given a decimal such as 0.111, write, $\frac{}{1}$
- Count the figures after the point – in the case of 0.111; there are three figures, so write three zeros after the 1 in the denominator, i.e. $\frac{}{1000}$
- In the numerator, write the figures that follow the decimal point, i.e. $\frac{111}{1000}$

The teacher's method produced correct answers but the explanation behind those answers made no sense mathematically. This was a case of his reconciling a new method of teaching with his limited knowledge of the concept. I could have discussed that issue with the teacher in the feedback session as I believed that dialogue promotes shared understanding. However, this was our last meeting regarding the research partnership. The teacher might not have had time to clarify his concept and then inform students' concepts.

Tension

I was aware that implicit assumptions as a researcher and my intervention as a teacher educator might encourage the teacher's dependency on me resulting in an expert-teacher rather than learner-learner partnership.

There was a conflict between different assumptions lying behind each of my roles. This raised the questions for me about how I could ignore my assumptions lying behind my commitment to achieve a co-learning partnership or my responsibility as a teacher educator to achieve teacher development. Could I separate them? Could the teacher gain the knowledge (he needed) by himself? Did my moral encouragement alter knowledge constraints? There was the possibility that the teacher's ignorance or lack might cause drawbacks in the students' learning and his teaching. It was also that teachers need a good understanding of mathematics to shift their practice towards the promotion of students' thinking (Ma, 1999). It was difficult for me to follow my own philosophy of learning in the face of the reality of these teachers' practice in school. I questioned my philosophy: How could my ideology fit in this context of constraints? Was the ideology flawed? I realized that working with my ideology would cost the teachers time, energy and motivation, which could result in disappointment.

My Intervention

Referring to Example 1, I involved the teacher in a paper folding activity through which he could experience an approach to the concept of fractions and their connections to percentages. It is evident (Mohammad, 2002) that when the teacher understood the concept himself he suggested that we could discuss different fractions by dividing a whole into parts, and then move to dividing it into a hundred parts. He also added that

we should include some verbal examples from daily life, as we discussed before, and then move to the textbook exercise.

Referring to Example 2 I realized a need to demonstrate the teacher's method with appropriate mathematical explanations so that he could find the gaps in his understanding as well as fill those gaps. To reduce a sense of threat of my intervention I asked him if I could take part in the teaching as I developed interest in that topic, and he accepted. I intentionally reviewed his first activity before I went on to the second part of his lesson in order to give an appropriate meaning of decimals because of the following reasons:

- I wanted to reduce any negative impression created by rejecting his methods, and I also wanted to protect him from humiliation.
- I wanted to maintain continuity in the lesson and wanted to teach the teacher ways to link the first activity to the other.

In the feedback session we discussed the topic further (for example, what is meant by 0.432). The teacher analysed his planning process, and his misinterpretation of decimal points. Analysing the impact of his limited knowledge in the lesson, he said that he had not taught the meaning of decimal points before, nor had he himself learned in this way. We discussed various issues, for example, my interruption in his teaching, and his learning of mathematics. The teacher said that my taking over the teaching was the right decision. He suggested such support might prevent the students from being given wrong concepts while the teacher could benefit from acquiring mathematical learning.

DISCUSSION

The above examples revealed that problems with mathematical knowledge presented a barrier to the teacher in unpacking the conceptual underpinning of mathematical procedures when they made the effort to plan and teach the lessons with reasoning. I, as a teacher educator, felt myself in a responsible position in terms of my understanding of teacher education, and the practical realities of the teachers, resulting in my taking a leading role. However, the differences in knowledge and understanding, in our partnership, were not viewed as teachers' deficits or a teacher educator's surplus but were appreciated as resources of co-learning. When the teachers received practical support from the teacher educator, they were able to resolve local problems and develop teaching. However, for long-term development teachers still need support and an understanding of the global issues of their comprehending what is needed within the development processes. I judge as teachers' needs were satisfied and their practical realities addressed, the two partners grew to achieve a relationship of trust in a co-learning partnership. I refer here to a teacher's comment at the end of a partnership day as an example of the issues raised by the collaborative partnership.

> You are leaving me at the wrong time. With you, I understood my role in my improvement. I am becoming confident about how that learning situation could be improved in the inconvenient situation of the classroom (7 August, 2000).

It is important to recognise here that our partnership was still developing.

Conceptually a commitment to learning establishes a teacher educator as a learner along with the teachers. However, the responsibility of a teacher educator of teachers' developing teaching cannot be ignored. In the context of Pakistan, teachers have never been encouraged to question or analyse their own or others' actions within their schools, except their short-term experiences of learning at the University. In addition, teachers have limited knowledge and understanding of mathematics relating to new practice. Also, teachers might not be aware of their own mathematical misconceptions. Therefore, it is likely to be difficult to develop an attitude in which teachers see questioning as learning. Thus, the assumptions behind being reflective learners in isolation from teachers' limitations, without rationalisation of their reality, might not be enough to support teachers' learning in a collaborative partnership.

New Understanding of a Co-Learning Partnership

A co-learning partnership does not view an explicit authority on either side. However, the partnership itself is authoritarian - a common purpose of 'improvement' directs the partners to accept a mutual agreement and lead them to play their parts with appropriate support to achieve their development. This authority negotiates differences of knowledge and understanding positively leading the teachers to apply their learning of a new mode of teaching in their own classroom, within numerous constraints, and the teacher educator to take responsive actions to promote the teachers' self-realization within constraints and ignorance.

The nature of collaborative partnership cannot be achieved by the singular influence of any ideology or the theoretical assumptions of collaborative work. It is utterly dependent on the needs of the teachers and the reality of their context. Developing an attitude in which teachers see and experience questioning as learning should be integrated with the provision of adequate interventions. My study confirms that imposition leads to improvement only if it is central to teachers' needs and addresses the practical reality of their school. Input nurtures teachers' practice and thinking without taking away their autonomy. Also the threat of humiliation can be reduced if teacher educators sit with the teacher and offer support in ways consistent with encouraging the teacher's thinking and autonomy. Expecting teachers to be ongoing learners in their improvement without considering their constraints and providing appropriate support may retain the threat of power imbalance in terms of working relationships (between teachers and a teacher educator or schools and university) leading to unobtainable teacher development within the school environment. Differences in knowledge cannot be denied, nor can the critical reality for teachers in a school context. My conclusion is that the philosophy of a teacher educator causes tensions when it does not fit with the school reality.

Achievement of the collaborative culture of learning is not the result of a contribution of equal levels of knowledge and understanding. Rather it is the achievement of a growing relationship where a teacher educator supports teachers morally and practically while trying not to lower their self-esteem. Thus balance of power in a teacher educator's engagement does not imply an authority to impose his or her theoretical perspectives on teachers. Neither does it claim to achieve equal decision making status in the initial stages of collaboration between teachers and a teacher educator. The notion of power-imbalance could be perceived as a positive element in supporting teachers' learning

according to their real constraints. My study exemplifies how teacher educators might help teachers to gain a better understanding and confidence; and if knowledge is power and responsibility also a power then power always exists but a threat of power in impeding learning is reduced through a co-learning partnership. The need is not to deny this power but to declare ways to negotiate the power so as to create a trusting relationship for learning, i.e. a relationship where partners feel secure and confident and achieve mutual dependency and interdependency in decision-making. Thus, establishment of a co-learning partnership is to achieve a shared goal of learning from and with each other in a trusting environment that supports learning processes with an awareness and integration of contextual reality.

Endnotes

[1] The textbook suggests 'percentages are special fractions'

[2] Zakat is one of the fundamentals of Islam; according to it Muslims are obliged to share 2.5% of annual saving with the poor.

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