

# **Understanding Science Teaching and Conceptions of the Nature of Science in Pakistan through a Life History Study**

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In this study I have tried to understand and develop a deeper understanding of science teaching in Pakistan. Two main questions guided the inquiry:

- 1) What is a female science teacher's understanding of teaching science in a school in Pakistan?
- 2) What aspects of the science teacher's conceptions of the nature of science are explicit in her practice?

I have used a narrative mode of research, using what is called the life history method. Life histories allow and encourage the researcher to adopt a broader understanding of teaching by providing illustration of the relationships between various aspects of teachers' lives and their teaching practice, both inside and beyond the classroom. I chose to work with a female teacher because I myself have been a female teacher of sci-

ence. My own experience of school and teaching gave the science teacher and me a shared basis for understanding each other. Another reason that I chose to work with a female teacher is that Pakistan is a highly patriarchal society and I was concerned that the power imbalance between the sexes might affect the data generated.

I interviewed Munazza<sup>1</sup> thirteen times and engaged in innumerable conversations with her while observing her teach science in classes seven and eight spread over a time period of 15 months. Munazza is a young science teacher with a BSc degree and eight years experience of teaching. She has had no exposure to teacher education, as teacher training is not deemed essential, especially for teachers in the private sector. She taught in an urban coeducational, afternoon shift school of a

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<sup>1</sup>Pseudonyms have been used for the teacher and the school in which she practiced

large private school system in Karachi. I have named this school the Karachi Model Secondary School (KMSS)<sup>1</sup>. I also observed a few of Munazza's other classes and interviewed a number of science teachers in the school and members of the administrative staff. The purpose was to obtain a complete picture of her teaching practice within the school context.

The importance of this study does not lie in the construction of universal truths about knowledge that science teachers have about teaching. Its significance lies in the deeper understanding of a teacher's practical knowledge of teaching and a more penetrating view of her epistemological understanding of school science. The rich description of her personal life and her classroom teaching, supported by analytic interpretations of her classroom teaching and her conceptions of the nature of science, shows the deep parallels between her personal life and professional life. It also lays bare the complexity of teaching that belies efforts to render it technical and mechanistic by some forms of curriculum reform.

Analysis of data took place at several levels. The first level was the informal analysis and interpretation that took place while interviewing and observing. The second level of analysis was the reading and writing of interview summaries and field notes. This also included sharing the summaries with Munazza. The third level was the beginning of more formal data analysis where I read through the data to select stories for portrayal. The fourth level involved the use of different techniques to analyze data. I used an eclectic mix of techniques to analyze data, drawing on work by Strauss & Corbin (1990) and Lofland & Lofland (1995).

Munazza has a good grounding of science content knowledge and that helps her to devise activities for student learning. However, her repertoire of ways to deal with students and teaching science depends on how she experienced teaching in school and college. Though she wants to and has tried to teach in the way that she was *not* taught but without experience of what that means she remains limited in her efforts. If teachers are to act as pedagogical change-agents, then new ways of thinking about teaching and knowledge have to become a part of their experiences - a part of their lives. This study has made it clear that teachers are much more likely to use methods of teaching or ways of thinking that they were exposed to when in school or college.

Science teaching is a difficult job. Teachers have to do a number of things in class - teach scientific content, develop the skills of science and foster scientific attitudes. As if this was not enough, science teachers also need to pay attention to the messages they convey explicitly or implicitly about the nature of science. Analy-

sis of data showed that Munazza has strongly positivist conceptions about the nature of science. She believes that all scientific propositions are based on data and that observations of reality correspond exactly to an external reality. Her conceptions include the belief that reality is directly accessible through the senses. An a priori theoretical lens is not needed to direct observation and to make sense of data. She also believes that science is value-free, superior and a stable form of knowing. She believes that science is a masculine domain and is a hard subject where women have to work harder to make a place for themselves. These views are conveyed to her through teaching of science in school and college, through her textbooks and even the society at large. An illusion of science knowledge as complete and certain governs her pedagogy in science teaching.

Conclusions of this study emphasize that early experiences influence beliefs and behaviours regarding teaching and learning. Enabling teachers to identify these life experiences provide them with insight into their philosophical position about education, about the nature of science and pedagogical decisions taken in the classroom. Opportunity for teacher educators to engage in this kind of reflection with teachers has some distinct benefits. It has the potential of making explicit the difference between teachers' 'theory-in-use' and 'espoused theory' (Argyris and Schon, 1980). Through this confrontation teachers can become more aware of their theory-in-use and learn to act more effectively in and outside the classroom. My study has shown that teachers will use their personal practical knowledge to make decisions about what and how to teach in the class and that the basis for this kind of knowledge is their life history. This is the only kind of professional development that lasts - to make innovation a part of the life experience and life history of the teacher.

## References

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